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Objectives of this study on the influence of visual deprivation upon the divergent thinking dimension of intelligence were to compare the divergent thinking abilities of blind and sighted children in residential and day school programs, and to determine the relationship between divergent thinking and age of onset of blindness, mobility, school achievement, and sex differences. Six tests of divergent thinking and three Stanford Achievement Test subtests were administered to 228 children (aged 10 to 12 with average IQ's) in three groups (sighted, blind residential, and blind day school students) of 76 each. The blind groups received a mobility rating by their teachers. Results showed blind children to be more fluent but otherwise generally equal to sighted children in divergent thinking. No major differences were found in scores of residential and day school blind. Little or no relationship was found between divergent thinking and school achievement and between divergent thinking and mobility among the blind subjects. Males tended to score higher than females, and could not be drawn regarding age of onset. (Author/SN)

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DIVERGENT THINKING IN BLIND CHILDREN

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DIVERGENT THINKING IN BLIND CHILDREN

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William J. Tisdall, A. Edward Blackhurst, and Claude H. Marks

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I. INTRODUCTION

A. Problem

The purpose of this investigation was to study the influence of visual deprivation upon the divergent thinking dimension of intelligence, and to examine the relationship between the divergent thinking abilities of blind children and their achievement in school.

The phenomenon of divergent thinking has received considerable attention in the research literature of education and psychology in recent years. The formulation of Guilford's (12) theoretical model of the Structure of Intellect has provided researchers with new avenues for more penetrating scrutiny of previously unexplored aspects of intellectual functioning. In the present study, divergent thinking is defined as that kind of thinking in which new information, or new combinations of ideas, are generated out of given or known information and which represents a respondents' performance on purported verbal measures of originality, fluency of ideas, flexibility of thought, and elaboration of ideas.

According to Guilford's theory, divergent thinking is a vital prerequisite to creativity which, in turn, is an important part of intelligence. By assessing various elements of the divergent thinking process, such as verbal fluency, flexibility, and originality in blind children, a new approach might be made available for closer examination of some of their intellectual characteristics and of the role which these elements play in the school achievement of these children. For purposes of this investigation, blindness is defined as residual vision of light perception or less (17).

B. Review of Related Research

Although some research has been conducted onthe creative expressions of blind children (22), it was done through the artistic medium of modeling. The need remains for an examination of the creative abilities of blind children along the intellectual, in addition to the artistic dimension. The effect which blindness has on the development of divergent thinking abilities of blind children is not known. Yet, there is evidence to support the contention that the blind do possess the ability to think divergently. Guilford (11), for example, argued that all persons possess the various abilities defined in this theoretical model in differing degrees since the abilities are assumed to be continously distributed variables. In addition, the work of Wilson, et. al (42) led to the conclusion that the intellectual component of originality is a continuous variable which is possessed by all individuals to some degree. Evidence of the existence of creative thinking ability in another educationally anomalous group, the mentally retarded, was found by Tisdall (35). He concluded that, under certain educational conditions, educable mentally retarded children do not perform significantly different from intellectually normal children on verbal tests of divergent thinking.

Lowenfeld (23) presented a strong argument for the existence of creative ability in everyone. He maintained that man possesses the ability to create intentionally while the animal does not. Thus, it follows that every man is a potential creator. At the same time, Lowenfeld indicated that the extent to which the creative ability is developed varies among individuals. Each person, he claimed, has functional and potential creative abilities. The former is that which is used by the individual while the latter is that portion of the person's creative ability which remains unused. Some individuals, because of their early training and experiences, have matured into essentially functional creators. Others, not having gained an awareness of their potential, have remained uncreative.

From the above, it is implied that, while Guilford's theoretical explanation of the nature of intelligence would substantiate the potentiality of all individuals to think divergently, Lowenfeld implies that deterrents to an awareness of that potential would lead to a truncating of divergent thinking ability. Since the severe sensory impairment of blindness leads to a supression of interaction with the environment, it would appear that blind individuals are more likely to develop as potential, rather than functional, divergent thinkers. Sighted children, on the other hand, having use of the visual sense modality, would more likely have greater and more varied opportunities to become functional divergent thinkers. The remainder of this discussion deals with factors which may influence the development of divergent thinking in blind children.

In an extensive review of research literature on the topic of the effects of environment upon intelligence, Hunt (16) concluded that a stimulating environmental background has a salutory effect on the development of an individual's intellect. At the same time, there is research evidence which points to the delimiting nature of blindness upon an individual's experiental background.

Norris, Spaulding, and Brodie (29), in a study of 225 congenitally blind pre-school children, found that the developmental and emotional deficits usually attributed to blindness are related primarily, not to the physical handicap itself, but to limitations in the opportunities for learning which are experienced by the child. They also found that blind children in residential schools scored lower on tests of intelligence and social maturity than did blind children who remained at home. In a follow-up study of these same subjects five years later, Norris (30) concluded that "Given favorable opportunities, the blind child can achieve a level of functioning much higher than that usually expected of him and one which compares favorably with that of other children of his chronological age" (p. 32).

It has often been said that parents of blind children tend to be over-protecting thereby restricting the scope of their youngster's experience (19). Several writers (1, 8, 15) have attributed the educational retardation often found among blind children to their limited range of experiences. Lowenfeld (21) has said that cognitive functions and mobility are problems intrinsic in blindness which lead to restrictions in the range and variety of concepts.

Torrance (39) stated that while children can learn through creative methods, much of what they learn is by authority. That is, they are to a great extent made dependent upon a teacher, either at home or at school. As a result, creativity is often stifled. Recognizing that dependence tends to engender conformity while independence fosters originality, Bauman and Yoder (2) pointed out that it is not always possible for blind persons to be original since in many activities they cannot function without depending upon sighted persons. Recent research on the characteristics of persons found to be divergent thinkers (25, 32, 38) has indicated that such persons tend to be willing risk-takers and are open to experiences. Again, the findings of Bauman and Yoder lead to the conclusion that, because the blind are more dependent and restricted in their activities than are sighted children, they would have fewer opportunities to develop divergent thinking abilities. In addition, McAndrews (27) concluded that blind children in residential schools tend to be more psychologically rigid and more sensitive to failure as a function of the isolation which blindness imposes upon the individual.

It is possible that the age at which a child became blind may affect his ability to think divergently. Toth (40), for example, found that children who become blind before the chronological age of five years lose the capacity for visual imagery.

Worchell (43) found that the adventitiously blind use visual imagery much more than the congenitally blind. The primary difficulty encountered by the congenitally blind was one of translating tactile impressions into visual imagery. Lukoff and Whiteman (24) in a study of 500 legally blind adolescents and adults concluded that the earlier the onset of blindness, the greater the likelihood of an independent pattern of adjustment. Another experiment, by Deutsch (9), may have some bearing upon the findings of Lukoff and Whiteman. Deutsch found that the curiosity of the congenitally blind was more easily satisfied than that of sighted persons. There was a tendency for the congenitally blind person to give up easily and escape into fantasy.

C. Summary of Related Research

1. According to Guilford's Structure of Intellect, all persons possess the ability to think divergently to some degree.

2. Compared to seeing children, the experiential background of blind children is restricted. This restriction may have a limiting effect upon the ability of blind children to think divergently.

3. Placement in a residential school constitutes a form of environmental circumscription for blind children. This, also, may place limitations on the child's ability to think divergently.

4. The age at which a child becomes blind appears to influence the child's visual imagery, school achievement, and, perhaps his personality.

D. Objectives

The primary objectives of this investigation are:

1. To study the effects of visual deprivation upon verbal divergent thinking in blind children when compared with visually normal children.

2. To study differences which may exist in the divergent thinking abilities of residential and day-school blind pupils.

3. To study differences which may exist in the divergent thinking abilities of children of varying ages of onset of blindness.

4. To study the realtionship between divergent thinking ability and the school achievement of blind children.

5. To examine differences which may exist in the verbal divergent thinking abilities of both blind and sighted males and females.

6. To examine the relationship between mobility and the divergent thinking abilities of blind children.

II. METHOD

A. Sample

The sample selected for this investigation consisted of 76 sighted children, 76 blind children enrolled in public day schools, and 76 blind children in residential schools for the blind. All subjects were enrolled in school programs in the Eastern half of the United States. Appendix A identifies the geographic locations of the schools from which the sample was drawn and the number of subjects selected from each school. For purposes of this study, blindness was defined as possessing visual acuity of light perception or less (17). All subjects were of average or above average intelligence and were between ten and twelve years of age.

The characteristics of the groups selected for the investigation are reported in Table 1. These data were collected by the project staff using the data sheet in Appendix B.

TABLE 1

CHARACTERISTICS OF THE SIGHTED, DAY SCHOOL BLIND AND RESIDENTIAL SCHOOL BLIND GROUPS

Variable	Sighted (N=76)[1]		Day Blind (N=76)[2]		Residential Blind (N=76)[3]	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
CA (Mos.)	141.28	8.48	140.00	10.03	140.28	9.26
MA (Mos.)	163.87	18.91	149.07	23.66	149.51	27.26
IQ	116.13	12.99	106.53	14.88	106.32	16.67
Years in School	6.08	0.67	5.93	1.00	5.81	1.15
Grade	6.08	0.67	5.47	1.00	5.17	1.30

[1] 40 Males; 36 Females
[2] 39 Males; 37 Females
[3] 34 Males; 42 Females

For purposes of determining group comparability, analyses were conducted between groups on the independent variables. The results of t tests (10) performed to test for significant differences between the mean scores of the sighted and day school blind subjects on the independent variables are reported in Table 2. There were no significant differences between the groups on chronological age and years in school. However, the sighted group was significantly superior to the day school blind group in mental age, IQ, and grade in school.

TABLE 2

TESTS OF SIGNIFICANCE BETWEEN MEAN SCORES OF SIGHTED AND DAY SCHOOL BLIND SUBJECTS ON INDEPENDENT VARIABLES

Variable	Sighted (N=76)		Day Blind (N=76)			
	Mean	S.D.	Mean	S.D.	t	P[1]
CA (Mos.)	141.28	8.48	140.00	10.03	0.84	N.S.
MA (Mos.)	163.87	18.91	149.07	23.66	4.20	.01
IQ	116.13	12.99	106.53	14.88	4.18	.01
Years in School	6.08	0.67	5.93	1.00	1.05	N.S.
Grade	6.08	0.67	5.47	1.00	4.39	.01

[1] Two-tailed test at 150 df

Differences between mean scores of the sighted and residential school blind subjects on the independent variables are reported in Table 3. The results of the t tests indicated that the sighted subjects were significantly higher in mental age, IQ, and grade in school. There were no differences between the groups in chronological age and number of years they had been in school.

The results of the t tests between the mean scores of the day school blind and residential school blind subjects on the independent variables are reported in Table 4. These analyses indicated that there were no significant differences between the two blind groups on the independent variables.

TABLE 3

TESTS OF SIGNIFICANCE BETWEEN MEAN SCORES OF SIGHTED AND RESIDENTIAL SCHOOL BLIND SUBJECTS ON INDEPENDENT VARIABLES

Variable	Sighted (N=76)		Residential Blind (N=76)			
	Mean	S.D.	Mean	S.D.	t	p[1]
CA (Mos.)	141.28	8.84	140.28	9.26	0.69	N.S.
MA (Mos.)	163.87	18.91	149.51	27.47	3.70	.01
IQ	116.13	12.99	106.32	16.67	3.99	.01
Years in School	6.08	0.67	5.81	1.15	1.73	N.S.
Grade	6.08	0.67	5.17	1.30	5.34	.01

[1] Two-tailed test at 150 df

TABLE 4

TESTS OF SIGNIFICANCE BETWEEN MEAN SCORES OF DAY SCHOOL BLIND AND RESIDENTIAL SCHOOL BLIND SUBJECTS ON INDEPENDENT VARIABLES

Variable	Day Blind (N=76)		Residential Blind (N=76)			
	Mean	S.D.	Mean	S.D.	t	p[1]
CA (Mos.)	140.00	10.03	140.28	9.26	0.18	N.S.
MA (Mos.)	149.07	23.66	149.51	27.47	0.11	N.S.
IQ	106.53	14.88	106.32	16.67	0.08	N.S.
Years in School	5.93	1.00	5.81	1.15	0.86	N.S.
Grade	5.47	1.00	5.17	1.30	1.76	N.S.

[1] Two-tailed test at 150 df

Table 5 summarizes the results of the t tests between mean chronological ages, IQ scores, number of years in school, and grade level for the sighted, day school blind, and residential school blind males and females respectively. There were no significant differences between males and females in either the sighted or day school blind groups. However, residential school blind females were significantly older and were in higher grades than were residential school blind males.

Since chronological age was a selection criterion for the subjects in this investigation, no significant differences in CA were found between groups. Differences were found, however, on the MA and IQ variables. That is, the sighted subjects had significantly higher MA's and IQ's than both the day school and residential school blind subjects.

Even though these MA and IQ differences were found, because of the low correlation reported between intelligence and tests of divergent thinking (36), it was felt that these differences would not differentially affect the divergent thinking test scores. Furthermore, and more important, the intelligence criterion was construed for purposes of this study as a screening device only in order to ascertain that no mentally retarded subjects were included in the sample. In addition, IQ comparisons between the blind and sighted subjects in this study were viewed with caution, since the same tests were not used with all subjects. At any rate, the variable of intelligence was not used as a significant variable in the analyses of this study.

It was also found that there were significant differences among the three groups with respect to grade level in school. Sighted children tended to be placed in higher grade levels than both groups of blind children. Likewise, the day school blind group was slightly higher than the residential school blind group. These differences in grade level could be a function of learning difficulties encountered by the blind children--particularly in the residential schools. This is supported by the fact that years in school corresponded exactly to grade level for the sighted subjects, whereas the blind children were placed in grade levels lower than would be expected on the basis of the number of years they had been in school. This is consistent with the findings reported by Lowenfeld (21) that blind children are over-age for their grade levels.

TABLE 5

TESTS OF SIGNIFICANCE BETWEEN MEAN SCORES OF MALES AND FEMALES ON INDEPENDENT VARIABLES BY GROUP

Variable	Sighted Subjects					
	Males (N= 40)		Females (N= 36)			
	Mean	S.D.	Mean	S.D.	t	p[1]
CA	141.88	8.10	140.60	8.85	0.64	N.S.
MA	167.58	20.14	159.63	16.41	1.83	N.S.
IQ	118.35	14.11	113.60	11.06	1.58	N.S.
Yr. in School	6.13	0.64	6.03	0.70	0.62	N.S.
Grade	6.13	0.64	6.03	0.70	0.62	N.S.

	Day School Blind Subjects					
	Males (N= 39)		Females (N= 37)			
	Mean	S.D.	Mean	S.D.	t	p
CA	140.45	9.95	139.54	10.08	0.39	N.S.
MA	151.53	23.55	146.54	23.49	0.91	N.S.
IQ	107.97	14.74	105.05	14.88	0.84	N.S.
Yrs. in School	5.95	1.00	5.92	1.00	0.12	N.S.
Grade	5.53	0.99	5.41	1.00	0.52	N.S.

	Residential School Blind Subjects					
	Males (N= 34)		Females (N= 42)			
	Mean	S.D.	Mean	S.D.	t	p
CA	137.79	9.85	142.24	8.25	2.10	.05
MA	144.24	26.36	153.64	27.01	1.51	N.S.
IQ	104.30	15.87	107.90	17.11	0.92	N.S.
Yrs. in School	5.70	1.17	5.90	1.13	0.77	N.S.
Grade	4.79	1.41	5.48	1.12	2.33	.05

---

[1] Two-tailed test at 74 df

B. Instrumentation

1. Tests of Divergent Thinking

Six tests of divergent thinking were administered to each subject. The tests and the sub-tests are presented below. The forty-one starred items indicate the dimensions for which scores were obtained.

1. Word Fluency (6)
    - B Sub-test *
    - T Sub-test *
    - Total Word Fluency *

2. Product Improvement (37)
    - Fluency *
    - Flexibility *
    - Originality *
    - Elaboration *

3. Unusual Uses (41)
    - Brick Sub-test
        - Fluency*
        - Flexibility*
        - Breadth*
    - Heat Sub-test
        - Fluency*
        - Flexibility*
        - Breadth*
    - Water Sub-test
        - Fluency*
        - Flexibility*
        - Breadth*
    - Total Unusual Uses Fluency*
4. Consequences (7)
    - Food Sub-test
        - Fluency*
        - Flexibility*
        - Breadth*
        - Remote*
        - Obvious*
    - Read and Write Sub-test
        - Fluency*
        - Flexibility*
        - Breadth*
        - Remote*
        - Obvious*

4. Consequences (7) (Cont'd.)
   - Balance Sub-test
     - Fluency*
     - Flexibility*
     - Breadth*
     - Remote*
     - Obvious*
   - Total Consequences Fluency*

5. Ideational Fluency (5)
   - Drink Sub-test*
   - Sweet Sub-test*
   - Smooth Sub-test*
   - Green Sub-test*
   - Total Ideational Fluency*

6. Seeing Problems (33)
   - Hammer Sub-test*
   - Wind Sub-test*
   - Glue Sub-test*

2. Pilot Study

A brief pilot study was conducted for the purpose of determining whether or not blind children could respond meaningfully to the tests of divergent thinking which were used in this study. The tests were administered to ten children, between the ages of 10 and 12, from the Western Pennsylvania School for the Blind. Their scores were analyzed for the purpose of determining relevance of response. It was found that blind subjects were capable of providing meaningful and relevant responses to these verbal tests of divergent thinking.

3. Scoring the Tests of Divergent Thinking

Upon attempting to score the tests of divergent thinking, it was found that the scoring criteria proposed by the authors of the tests were not, in a number of cases, sufficiently broad to permit categorization of the subjects' responses. It was therefore necessary to revise the scoring criteria accordingly.

Upon revision, the extent of agreement among scorers as to the application of the criteria was determined. The test papers of fifteen different subjects were randomly selected for each of the six tests of divergent thinking. Three members of the project staff scored each test independently according to the revised scoring criteria. The total number of responses was then computed for each of the tests as was the number of instances in which the scorers did not agree. The percentage of inter-scorer agreement was then calculated. These data are presented in Table 6.

TABLE 6

PERCENTAGE OF INTER-SCORER AGREEMENT[1]

EST	TOTAL NUMBER OF RESPONSES SCORED	NUMBER OF DISAGREEMENTS	PERCENTAGE OF AGREEMENT
ORD FLUENCY	478	11	97.7
RODUCT IMPROVEMENT			
Different Categories	146	9	93.8
Originality	146	15	89.7
Elaboration	146	8	94.5
NUSUAL USES			
Brick	116	15	87.0
Heat	118	14	88.1
Water	102	10	90.2
ONSEQUENCES			
Food	120	12	90.0
Read & Write	128	19	85.2
Balance	109	14	87.2
DEATIONAL FLUENCY			
Drink	176	7	96.0
Sweet	161	13	91.9
Smooth	266	23	91.4
Green	210	10	95.2
EEING PROBLEMS			
Hammer	140	13	90.7
Wind	142	16	88.7
Glue	141	15	89.4

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[1] Based on three independent observations of the scores of fifteen different subjects on each sub-test.

In ten of the seventeen cases, the percentage of inter-scorer agreement was ninety or higher. The lowest percentage of agreement was 85.2. Provisions were then made to further assure the accuracy and consistency of the scoring. That is, test scorers were instructed to discuss questionable responses which arose during the scoring process and reach agreement before assigning that response to a category.

All test papers were assigned random numbers prior to scoring by a person not associated with the project. Thus, the scorers were not aware whether the tests which they corrected were those of day school blind, residential school blind, or sighted children. This "single blind" technique prevented scorer bias.

4. Achievement Tests

Jones (17) recommended that individual, orally administered achievement tests were appropriate for administration to blind children. Therefore, the Word Meaning, Paragraph Meaning, and Arithmetic Applications sub-tests of the 1964 revision of the Stanford Achievement Test (Intermediate II) were administered orally by the teachers to all blind subjects. The braille responses of the subjects were scored by members of the project staff.

The standard version of these same sub-tests was administered in the conventional fashion to each of the sighted subjects. Several problems in the Arithmetic Sub-test which required vision for interpreting charts and/or graphs were not administered (Appendix C.)

5. Mobility Rating Scale

The teachers of the blind subjects completed mobility ratings, for each of their students (Appendix D). It was planned that ratings, on a seven point scale, were to be obtained on mobility in the classroom, the school, on the schoolgrounds, and in the community. The teachers expressed the opinion that they did not have sufficient information upon which to rate mobility in the community; therefore, this item was eliminated from the rating scale.

C. Methods of Analysis

To test for significant differences between groups, mean scores on each of the variables were computed for each group. Comparisons between means were then performed using t tests (10). The following comparisons were made: (a) sighted vs. day school blind subjects, (b) sighted vs. residential school blind subjects, and (c) day school blind vs. residential school blind subjects. Differences between mean scores of males and females in each of the three groups received similar analysis. The .05 level of confidence was set as the criterion for rejecting the null hypotheses.

The relationship between school achievement and divergent thinking was examined by computing Pearson product-moment correlations (10) between the forty-one tests of divergent thinking and the three achievement measures for each group.

Similarly, correlations between mobility ratings and scores on the tests of divergent thinking of the residential and day school blind groups were computed in order to examine the relationship between these two variables.

Factor analyses (3) were performed in order to examine the interrelationships among the independent and dependent variables. Principal components solutions were obtained and varimax rotations (4) were performed to achieve simple structure. A separate factor analysis was performed for each of the three groups of subjects.

All statistical analyses were performed using raw score data.

111 RESULTS

The results of the statistical analyses performed on the data obtained in the main investigation are reported in this section.

A. Sighted vs. Day School Blind Subjects

1. Differences in Divergent Thinking (Sighted vs. Day School Blind)

The results of the *t* tests between mean scores of the sighted and day school blind subjects on the tests of divergent thinking are reported in Table 7. Sighted subjects had significantly higher mean scores on the following tests:

(1) Product Improvement
  a. Flexibility
  b. Originality

(2) Unusual Uses
  a. Flexibility (Brick)
  b. Breadth (Brick)

(3) Seeing Problems
  a. Hammer
  b. Wind
  c. Glue

Day school blind subjects scored significantly higher on these tests:

(1) Word Fluency
  a. Sub-test B
  b. Sub-test T
  c. Total

(2) Consequences
  a. Fluency (Food)
  b. Obvious (Food)
  c. Fluency (Read and Write)

(3) Ideational Fluency
  a. Drink
  b. Sweet
  c. Green
  d. Total

TABLE 7

TESTS OF SIGNIFICANCE BETWEEN MEAN SCORES OF SIGHTED AND DAY SCHOOL BLIND SUBJECTS ON TESTS OF DIVERGENT THINKING

TEST	Day Blind (N=76) Mean	Day Blind (N=76) S.D.	Sighted (N=76) Mean	Sighted (N=76) S.D.	t	P[1]
WORD FLUENCY						
B	17.29	6.28	14.53	4.20	3.14	.01
T	18.53	7.18	16.47	4.27	2.13	.05
Total	35.83	12.55	31.00	7.48	2.84	.02
PRODUCT IMPROVEMENT						
Fluency	10.61	6.18	11.96	6.26	1.32	N.S.
Flexibility	4.44	3.06	5.69	2.97	2.53	.02
Originality	16.04	10.35	19.97	11.50	2.19	.05
Elaboration	12.71	8.08	13.56	7.43	0.67	N.S.
UNUSUAL USES						
Brick						
Fluency	6.51	3.17	7.13	2.97	1.24	N.S.
Flexibility	3.87	2.69	4.87	2.22	2.46	.02
Breadth	3.73	1.72	4.59	1.42	3.29	.01
Heat						
Fluency	8.25	3.76	8.31	3.02	0.10	N.S.
Flexibility	5.35	2.76	5.67	2.24	0.77	N.S.
Breadth	5.17	1.96	5.36	2.00	0.57	N.S.
Water						
Fluency	7.12	3.68	6.92	2.54	0.38	N.S.
Flexibility	4.81	2.96	4.88	2.10	0.16	N.S.
Breadth	4.73	2.26	5.31	1.72	1.73	N.S.
Total Fluency	21.88	8.85	22.43	7.35	0.41	N.S.
CONSEQUENCES						
Food						
Fluency	8.93	4.42	7.36	2.81	2.58	.02
Flexibility	4.33	2.77	4.37	2.01	0.10	N.S.
Breadth	3.68	1.50	3.75	1.14	.030	N.S.
Remote	1.60	1.72	1.97	1.83	1.28	N.S.
Obvious	7.33	4.25	5.39	2.99	3.25	.01
Read & Write						
Fluency	8.85	3.44	7.69	3.02	2.18	.05
Flexibility	3.95	2.59	3.60	2.03	0.91	N.S.
Breadth	3.39	1.48	3.21	1.30	0.76	N.S.
Remote	1.95	1.59	1.75	1.45	0.77	N.S.
Obvious	6.09	3.06	6.01	3.00	1.77	N.S.

(Table 7 Continued on next page)

TABLE 7 (continued)

TEST	Day Blind (N=76)		Sighted (N=76)			
	Mean	S.D.	Mean	S.D.	t	P[1]
Balance						
Fluency	6.13	3.29	6.45	2.68	0.65	N.S.
Flexibility	3.48	2.29	3.89	2.28	1.10	N.S.
Breadth	3.52	1.60	3.72	1.55	0.77	N.S.
Remote	1.37	1.61	1.56	1.53	0.72	N.S.
Obvious	4.76	2.95	4.89	2.19	0.31	N.S.
Total Fluency	23.92	8.87	21.51	7.40	1.80	N.S.
IDEATIONAL FLUENCY						
Drink	10.72	5.27	8.71	3.29	2.79	.01
Sweet	8.72	5.07	6.37	3.78	3.19	.01
Smooth	10.20	5.75	10.67	4.85	0.53	N.S.
Green	5.79	5.37	4.17	3.61	2.15	.05
Total	35.44	17.29	29.96	11.79	2.25	.05
SEEING PROBLEMS						
Hammer	2.08	1.59	2.87	1.45	3.15	.01
Wind	2.93	1.46	3.51	1.00	2.78	.01
Glue	2.51	1.56	3.23	1.31	3.04	.01

[1] Two-tailed test at 150 d f

2. Differences in Achievement (Sighted vs. Day School Blind)

Table 8 contains the results of the t tests between mean achievement test scores of the sighted and day school blind subjects. Sighted subjects scored significantly higher on the Word Meaning Sub-test. There were no differences between the groups in Paragraph Meaning and Arithmetic Applications.

TABLE 8

TESTS OF SIGNIFICANCE BETWEEN MEAN ACHIEVEMENT TEST SCORES OF SIGHTED AND DAY SCHOOL BLIND SUBJECTS

SUB-TEST	Sighted (N=76)		Day Blind (N=76)		t	P[1]
	Mean	S.D.	Mean	S.D.		
Word Meaning	31.43	6.76	27.60	10.00	2.73	.01
Paragraph Meaning	37.72	7.65	38.16	12.07	0.26	N.S.
Arithmetic Applications	17.00	4.31	15.80	7.16	1.24	N.S.

[1] Two-tailed test at 150 d f.

B. Sighted vs. Residential School Blind Subjects

1. Differences in Divergent Thinking (Sighted vs. Residential School Blind)

The t tests reported in Table 9 indicate that the sighted subjects scored significantly higher than the residential school blind subjects on the following tests of divergent thinking:

(1) Product Improvement
  a. Fluency
  b. Flexibility
  c. Originality
  d. Elaboration

(2) Unusual Uses
  a. Flexibility (Brick)
  b. Breadth (Brick)

(3) Seeing Problems
  a. Wind

- The residential school blind subjects scored significantly higher on the following tests of divergent thinking:

  (1) Consequences
    a. Obvious (Food)

  (2) Ideational Fluency
    a. Green
    b. Total

TABLE 9

TESTS OF SIGNIFICANCE BETWEEN MEAN SCORES OF SIGHTED AND RESIDENTIAL SCHOOL BLIND SUBJECTS ON TESTS OF DIVERGENT THINKING

TEST	Sighted (N=76)		Residential Blind (N=76)			
	Mean	S.D.	Mean	S.D.	t	P[1]
WORD FLUENCY						
B	14.53	4.20	14.97	6.37	0.50	N.S.
T	16.47	4.27	16.13	6.51	0.37	N.S.
Total	31.00	7.48	31.11	12.17	0.06	N.S.
PRODUCT IMPROVEMENT						
Fluency	11.96	6.26	9.19	5.49	2.87	.01
Flexibility	5.69	2.97	4.05	2.73	3.50	.01
Originality	19.97	11.50	14.72	9.54	3.03	.01
Elaboration	13.56	7.43	10.61	6.33	2.60	.02
UNUSUAL USES						
Brick						
Fluency	7.13	2.97	6.55	3.11	1.17	N.S.
Flexibility	4.87	2.22	3.99	2.29	2.37	.02
Breadth	4.59	1.42	3.76	1.48	3.47	.01
Heat						
Fluency	8.31	3.02	7.53	3.30	1.49	N.S.
Flexibility	5.76	2.24	5.05	2.56	1.59	N.S.
Breadth	5.36	2.00	5.03	1.83	1.06	N.S.
Water						
Fluency	6.92	2.54	7.35	3.24	0.89	N.S.
Flexibility	4.88	2.10	5.11	2.62	0.58	N.S.
Breadth	5.31	1.72	5.04	1.93	0.89	N.S.
Total Fluency	22.43	7.35	21.44	7.99	0.78	N.S.

(Table 9 continued on next page)

TABLE 9 (Continued)

TEST	Sighted (N=76)		Residential Blind (N=76)			
	Mean	S.D.	Mean	S.D.	t	P[1]
CONSEQUENCES						
Food						
Fluency	7.36	2.81	8.19	3.17	1.68	N.S.
Flexibility	4.37	2.01	4.05	2.33	0.90	N.S.
Breadth	3.75	1.14	3.43	1.38	1.54	N.S.
Remote	1.97	1.83	1.56	1.62	1.46	N.S.
Obvious	5.39	2.90	6.56	3.14	2.36	.02
Read & Write						
Fluency	7.69	3.02	8.47	3.65	1.41	N.S.
Flexibility	3.60	2.03	3.51	2.67	0.24	N.S.
Breadth	3.21	1.30	3.16	1.56	0.23	N.S.
Remote	1.75	1.55	2.07	2.26	1.00	N.S.
Obvious	6.01	3.00	6.40	2.94	0.79	N.S.
Balance						
Fluency	6.45	2.68	6.79	3.42	0.66	N.S.
Flexibility	3.89	2.28	3.61	2.35	0.74	N.S.
Breadth	3.72	1.55	3.53	1.45	0.76	N.S.
Remote	1.56	1.53	1.93	2.03	1.26	N.S.
Obvious	4.89	2.19	4.87	2.65	0.07	N.S.
Total Fluency	21.51	7.40	23.44	8.60	1.47	N.S.
IDEATIONAL FLUENCY						
Drink	8.71	3.29	9.73	4.56	1.57	N.S.
Sweet	6.37	3.78	7.79	5.22	1.89	N.S.
Smooth	10.67	4.85	11.05	5.70	0.44	N.S.
Green	4.17	3.61	6.00	4.26	2.82	.01
Total	29.96	11.79	34.56	15.09	2.07	.05
SEEING PROBLEMS						
Hammer	2.87	1.45	2.71	1.03	0.71	N.S.
Wind	3.51	1.00	2.92	1.20	3.24	.01
Glue	3.23	1.31	2.99	1.27	1.13	N.S.

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[1] Two-tailed test at 150 d f

2. Differences in Achievement (Sighted vs. Residential School Blind)

The results of the t tests between achievement test means of the sighted and residential school blind subjects are reported in Table 10. Sighted subjects scored significantly higher on the Word Meaning and Arithmetic Applications Sub-tests. There was no significant difference between the groups in Paragraph Meaning.

TABLE 10

TESTS OF SIGNIFICANCE BETWEEN MEAN ACHIEVEMENT TEST SCORES OF SIGHTED AND RESIDENTIAL SCHOOL BLIND SUBJECTS

SUB-TEST	Sighted (N=76)		Residential Blind (N=76)			
	Mean	S.D.	Mean	S.D.	t	P[1]
Word Meaning	31.43	6.76	26.27	10.09	3.65	.01
Paragraph Meaning	37.72	7.65	34.91	12.17	1.68	N.S.
Arithmetic Applications	17.00	4.31	13.97	7.68	2.96	.01

[1] Two-tailed test at 150 d f

C. Day School Blind vs. Residential School Blind Subjects

1. Differences in Divergent Thinking (Day School Blind vs. Residential School Blind)

The results of the t tests between the mean divergent thinking scores of the day school blind and residential school blind subjects are reported in Table 11. These analyses indicate that the day school blind scored significantly higher on the following tests:

(1) Word Fluency
    a. Sub-Test B
    b. Sub-Test T
    c. Total

The residential school blind scored significantly higher on the following tests of divergent thinking:

(1) Consequences
    a. Remote (Balance)

(2) Seeing Problems
    a. Hammer
    b. Glue

TABLE 11

TESTS OF SIGNIFICANCE BETWEEN MEAN SCORES OF DAY SCHOOL BLIND AND RESIDENTIAL SCHOOL BLIND SUBJECTS ON TESTS OF DIVERGENT THINKING

TEST	Day (N=76)		Residential (N=76)			
	Mean	S.D.	Mean	S.D.	t	P[1]
WORD FLUENCY						
B	17.29	6.28	14.97	6.37	2.27	.05
T	18.53	7.18	16.13	6.51	2.18	.05
Total	35.83	12.55	31.11	12.17	2.36	.02
PRODUCT IMPROVEMENT						
Fluency	10.61	6.18	9.19	5.49	1.51	N.S.
Flexibility	4.44	3.06	4.05	2.73	0.87	N.S.
Originality	16.04	10.35	14.72	9.54	0.82	N.S.
Elaboration	12.71	8.08	10.61	6.33	1.79	N.S.
UNUSUAL USES						
Brick						
Fluency	6.51	3.17	6.55	3.11	0.08	N.S.
Flexibility	3.87	2.69	3.99	2.29	0.32	N.S.
Breadth	3.73	1.72	3.76	1.48	0.14	N.S.
Heat						
Fluency	8.25	3.76	7.53	3.30	1.28	N.S.
Flexibility	5.35	2.76	5.05	2.56	0.71	N.S.
Breadth	5.17	1.96	5.03	1.83	0.47	N.S.
Water						
Fluency	7.12	3.68	7.35	3.24	0.42	N.S.
Flexibility	4.81	2.96	5.11	2.62	0.68	N.S.
Breadth	4.73	2.26	5.04	1.93	1.00	N.S.
Total Fluency	21.88	8.85	21.44	7.99	0.32	N.S.
CONSEQUENCES						
Food						
Fluency	8.93	4.42	8.19	3.17	1.21	N.S.
Flexibility	4.33	2.77	4.05	2.33	0.68	N.S.
Breadth	3.68	1.50	3.43	1.38	1.25	N.S.
Remote	1.60	1.72	1.56	1.62	0.17	N.S.
Obvious	7.33	4.25	6.56	3.14	1.30	N.S.
Read & Write						
Fluency	8.85	3.44	8.47	3.65	0.67	N.S.
Flexibility	3.95	2.59	3.51	2.67	1.07	N.S.
Breadth	3.39	1.48	3.16	1.56	1.04	N.S.
Remote	1.95	1.59	2.07	2.26	0.40	N.S.
Obvious	6.89	3.06	6.40	2.94	1.04	N.S.

(Table 15 Continued on next page)

TABLE II (Continued)

TEST	Day (N=76)		Residential (N=76)			
	Mean	S.D.	Mean	S.D.	t	P [1]
CONSEQUENCES (Continued)						
Balance						
Fluency	6.13	3.29	6.79	3.42	1.24	N.S.
Flexibility	3.48	2.29	3.61	2.35	0.36	N.S.
Breadth	3.52	1.60	3.53	1.45	0.04	N.S.
Remote	1.37	1.61	1.93	2.03	2.00	.05
Obvious	4.76	2.95	4.87	2.65	0.25	N.S.
Total Fluency	23.92	8.87	23.44	8.60	0.34	N.S.
IDEATIONAL FLUENCY						
Drink	10.72	5.27	9.73	4.56	1.25	N.S.
Sweet	8.72	5.07	7.79	5.22	1.13	N.S.
Smooth	10.20	5.75	11.05	5.70	0.92	N.S.
Green	5.79	5.37	6.00	4.26	0.27	N.S.
Total	35.44	17.29	34.56	15.09	0.33	N.S.
SEEING PROBLEMS						
Hammer	2.08	1.59	2.71	1.30	2.86	.01
Wind	2.93	1.46	2.92	1.20	0.06	N.S.
Glue	2.51	1.56	2.99	1.27	2.18	.05

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[1] Two-tailed test at 150 d f

2. Differences in Achievement (Day School Blind vs. Residential School Blind)

The results of the t tests reported in Table 12 indicate that there were no significant differences in achievement between the day school blind and residential school blind subjects.

TABLE 12

TESTS OF SIGNIFICANCE BETWEEN MEAN ACHIEVEMENT TEST SCORES OF DAY SCHOOL BLIND AND RESIDENTIAL SCHOOL BLIND SUBJECTS

SUB-TEST	Day Blind (N=76)		Residential Blind (N=76)			
	Mean	S.D.	Mean	S.D.	t	P[1]
Word Meaning	27.60	10.00	26.27	10.09	0.82	N.S.
Paragraph Meaning	38.16	12.07	34.91	12.17	1.66	N.S.
Arithmetic Applications	15.80	7.16	13.97	7.68	1.52	N.S.

[1] Two-tailed test at 150 d f

3. Differences in Mobility (Day School Blind vs. Residential School Blind)

Table 13 summarizes the t tests performed to test for differences between the day school blind and residential school blind subjects on the three mobility scales. These analyses indicate that the residential school blind subjects were significantly more mobile in the classroom. On the other hand, the day school blind subjects were significantly more mobile in the school and on the schoolground.

Table 13

TESTS OF SIGNIFICANCE BETWEEN MEAN MOBILITY SCORES OF DAY SCHOOL BLIND AND RESIDENTIAL SCHOOL BLIND SUBJECTS

Mobility Scale	Day Blind (N=76)		Residential Blind (N=76)			
	Mean	S.D.	Mean	S.D.	t	P[1]
Classroom	3.74	3.05	5.05	1.41	3.33	.01
School	5.61	1.53	4.67	1.44	3.84	.01
Schoolground	4.93	1.80	4.29	1.58	2.29	.05

[1] Two-tailed test at 150 d f

D. Sex Differences

1. Differences in Divergent Thinking (Males vs. Females)

a. Sighted Males vs Females (Divergent Thinking). Table 14 summarizes the results of the *t* tests between the mean scores of the sighted males and females. These analyses indicate that the following significant differences, in favor of the sighted males, existed:

(1) Product Improvement
  a. Fluency
  b. Originality
  c. Elaboration

(2) Unusual Uses
  a. Fluency (Brick)
  b. Flexibility (Brick)
  c. Fluency (Heat)
  d. Fluency (Total)

(3) Consequences
  a. Breadth (Food)
  b. Remote (Food)
  c. Remote (Balance)

(4) Ideational Fluency
  a. Smooth

b. Day School Blind Males vs. Females (Divergent Thinking) Table 15 summarizes the results of the *t* tests between mean divergent thinking test scores of the day school blind males and females. These analyses indicate that the following significant differences, in favor of the males, existed:

(1) Product Improvement
  a. Fluency
  b. Originality
  c. Elaboration

(2) Unusual Uses
  a. Fluency (Brick)
  b. Flexibility (Brick)
  c. Breadth (Brick)

(3) Consequences
  a. Flexibility (Balance)
  b. Breadth (Balance)

TABLE 14

TESTS OF SIGNIFICANCE BETWEEN MEAN SCORES OF SIGHTED MALES AND FEMALES ON TESTS OF DIVERGENT THINKING

TEST	Males (N= 40)		Females (N= 36)			
	Mean	S.D.	Mean	S.D.	t	p[1]
WORD FLUENCY						
B	14.83	4.02	14.20	4.37	0.64	N.S.
T	16.60	4.08	16.31	4.48	0.29	N.S.
Total	31.43	7.19	30.51	7.77	0.52	N.S.
PRODUCT IMPROVEMENT						
Fluency	13.35	6.96	10.37	4.88	2.09	.05
Flexibility	6.25	3.01	5.06	2.79	1.75	N.S.
Originality	22.55	12.25	17.03	9.78	2.11	.05
Elaboration	15.25	8.29	11.63	5.72	2.14	.05
UNUSUAL USES						
Brick						
Fluency	7.88	3.30	6.29	2.25	2.37	.05
Flexibility	5.43	2.43	4.23	1.76	2.38	.02
Breadth	4.83	1.50	4.31	1.28	1.55	N.S.
Heat						
Fluency	9.18	2.83	7.31	2.93	2.76	.01
Flexibility	5.88	2.27	5.43	2.18	0.85	N.S.
Breadth	5.10	1.34	5.66	2.52	1.20	N.S.
Water						
Fluency	7.35	2.64	6.43	2.33	1.57	N.S.
Flexibility	5.23	2.13	4.49	2.01	1.52	N.S.
Breadth	5.60	1.76	4.97	1.61	1.58	N.S.
Total Fluency	24.48	7.49	20.09	6.43	2.67	.01

(Table 14 continued on next page)

TABLE 14

TEST	Males		Females			
	Mean	S.D.	Mean	S.D.	t	p[1]
CONSEQUENCES						
Food						
Fluency	7.45	2.51	7.26	3.12	0.29	N.S.
Flexibility	4.65	1.98	4.06	1.98	1.27	N.S.
Breadth	4.00	1.14	3.46	1.08	2.08	.05
Remote	2.53	1.97	1.34	1.39	2.92	.01
Obvious	4.93	2.43	5.91	3.28	1.47	N.S.
Read & Write						
Fluency	8.03	2.74	7.31	3.26	1.01	N.S.
Flexibility	3.68	1.99	3.51	2.06	0.34	N.S.
Breadth	3.25	1.16	3.17	1.44	0.26	N.S.
Remote	1.88	1.73	1.60	1.29	0.76	N.S.
Obvious	6.28	2.89	5.71	3.09	0.80	N.S.
Balance						
Fluency	6.83	2.70	6.03	2.59	1.28	N.S.
Flexibility	4.08	2.26	3.69	2.28	0.73	N.S.
Breadth	3.88	1.52	3.54	1.57	0.92	N.S.
Remote	1.90	1.74	1.17	1.13	2.08	.05
Obvious	4.93	2.17	4.86	2.22	0.13	N.S.
Total Fluency	22.30	6.62	20.60	8.11	0.99	N.S.
IDEATIONAL FLUENCY						
Drink	9.33	3.34	8.00	3.09	1.75	N.S.
Sweet	6.70	3.68	6.00	3.85	0.79	N.S.
Smooth	11.75	4.65	9.43	4.77	2.10	.05
Green	4.20	3.71	4.14	3.50	0.07	N.S.
Total	31.98	11.62	27.66	11.56	1.59	N.S.
SEEING PROBLEMS						
Hammer	3.03	1.41	2.69	1.47	1.01	N.S.
Wind	3.60	0.92	3.40	1.07	0.86	N.S.
Glue	3.30	1.38	3.14	1.22	0.51	N.S.

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[1] Two-tailed test at 74 d f

TABLE 15
TESTS OF SIGNIFICANCE BETWEEN MEAN SCORES OF DAY SCHOOL BLIND MALES AND FEMALES ON TESTS OF DIVERGENT THINKING

TEST	Males (N=39)		Females (N=37)			
	Mean	S.D.	Mean	S.D.	t	P[1]
WORD FLUENCY						
B	17.74	6.71	16.84	5.78	0.61	N.S.
T	17.89	7.06	19.19	7.25	0.77	N.S.
TOTAL	35.63	12.84	36.03	12.24	0.13	N.S.
PRODUCT IMPROVEMENT						
Fluency	12.08	6.03	9.11	5.97	2.11	.05
Flexibility	4.87	3.27	4.00	2.75	1.23	N.S.
Originality	18.68	11.19	13.32	8.61	2.29	.05
Elaboration	14.76	8.49	10.59	7.03	2.28	.05
UNUSUAL USES						
Brick						
Fluency	7.26	3.54	5.73	2.50	3.12	.05
Flexibility	4.55	2.88	3.16	2.28	2.28	.05
Breadth	4.16	1.68	3.30	1.64	2.21	.05
Heat						
Fluency	8.92	4.08	7.57	3.25	1.56	N.S.
Flexibility	5.74	2.92	4.95	2.52	1.24	N.S.
Breadth	5.50	2.22	4.84	1.57	1.47	N.S.
Water						
Fluency	7.26	3.45	6.97	3.90	0.04	N.S.
Flexibility	5.00	2.92	4.62	2.99	0.55	N.S.
Breadth	4.84	2.25	4.62	2.27	0.42	N.S.
Total Fluency	23.45	9.31	20.27	8.03	1.56	N.S.
CONSEQUENCES						
Food						
Fluency	9.34	4.41	8.51	4.39	0.80	N.S.
Flexibility	4.63	2.66	4.03	2.85	0.94	N.S.
Breadth	3.82	1.33	3.54	1.64	0.79	N.S.
Remote	1.50	1.39	1.70	2.00	0.50	N.S.
Obvious	7.84	4.25	6.81	4.18	1.04	N.S.

(Table 15 Continued on next page)

Table 15 (Continued)

TEST	Males (N=39)		Females (N=37)			
	Mean	S.D.	Mean	S.D.	t	P[1]
CONSEQUENCES (Continued)						
Read & Write						
Fluency	9.08	3.47	8.62	3.39	0.57	N.S.
Flexibility	4.03	2.29	3.86	2.86	0.27	N.S.
Breadth	3.39	1.31	3.38	1.63	0.05	N.S.
Remote	2.08	1.49	1.81	1.67	0.72	N.S.
Obvious	7.00	3.30	6.78	2.79	0.30	N.S.
Balance						
Fluency	6.71	3.19	5.54	3.29	1.54	N.S.
Flexibility	4.18	2.30	2.76	2.03	2.80	.01
Breadth	4.05	1.70	2.97	1.28	3.06	.01
Remote	1.50	1.73	1.24	1.48	0.68	N.S.
Obvious	5.21	2.87	4.30	2.47	1.34	N.S.
Total Fluency	25.13	8.78	22.68	8.79	1.19	N.S.
IDEATIONAL FLUENCY						
Drink	11.58	5.95	9.84	4.29	1.43	N.S.
Sweet	9.37	5.47	8.05	4.53	1.12	N.S.
Smooth	10.82	5.87	9.57	5.54	0.93	N.S.
Green	6.63	5.35	4.92	5.25	1.38	N.S.
Total	38.39	18.22	32.41	15.71	1.50	N.S.
SEEING PROBLEMS						
Hammer	2.26	1.65	1.89	1.50	1.00	N.S.
Wind	2.84	1.44	3.03	1.48	0.54	N.S.
Glue	2.76	1.61				

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[1] Two-tailed test at 74 d f

c. Residential School Blind Males vs. Females (Divergent Thinking)

The results of the t tests between mean divergent thinking test scores of the residential school blind males and females are reported in Table 16. The only significant difference was in favor of the females on the Breadth dimension of the Unusual Uses-Brick Sub-test.

TABLE 16

TESTS OF SIGNIFICANCE BETWEEN MEAN SCORES OF RESIDENTIAL SCHOOL BLIND MALES AND FEMALES TESTS OF DIVERGENT THINKING

TEST	Males (N=34)		Females (N=42)			
	Mean	S.D.	Mean	S.D.	t	P[1]
WORD FLUENCY						
B	14.39	5.59	15.43	6.89	0.69	N.S.
T	14.73	6.59	17.24	6.22	1.67	N.S.
Total	29.12	11.41	32.67	12.52	1.25	N.S.
PRODUCT IMPROVEMENT						
Fluency	9.36	5.77	9.05	5.26	0.24	N.S.
Flexibility	3.85	2.30	4.21	3.01	0.57	N.S.
Originality	15.52	9.93	14.10	9.17	0.63	N.S.
Elaboration	10.79	6.46	10.48	6.23	0.21	N.S.
UNUSUAL USES						
Brick						
Fluency	6.94	2.97	6.24	3.18	0.96	N.S.
Flexibility	33.64	1.61	4.26	2.68	1.17	N.S.
Breadth	3.30	0.80	4.12	1.76	2.44	.02
Heat						
Fluency	7.21	2.53	7.79	3.77	0.74	N.S.
Flexibility	4.64	1.92	5.38	2.92	1.25	N.S.
Breadth	4.91	1.56	5.12	2.01	0.49	N.S.
Water						
Fluency	7.06	3.10	7.57	3.32	0.67	N.S.
Flexibility	4.91	2.57	5.26	2.64	0.57	N.S.
Breadth	4.76	1.79	5.26	2.00	1.12	N.S.
Total Fluency	21.21	6.63	21.62	8.91	0.22	N.S.
CONSEQUENCES						
Food						
Fluency	8.12	3.40	8.24	2.98	0.16	N.S.
Flexibility	3.82	2.53	4.24	2.15	0.77	N.S.
Breadth	3.45	1.58	3.40	1.20	0.15	N.S.
Remote	1.79	1.79	1.38	1.45	1.07	N.S.
Obvious	6.18	3.20	6.86	3.06	0.92	N.S.
Read & Write						
Fluency	7.58	3.29	9.17	3.76	1.89	N.S.
Flexibility	3.03	2.28	3.88	2.89	1.37	N.S.

(Table 16 Continued on next page)

Table 16 (Continued)

TEST	Males (N=34)		Females (N=42)			
	Mean	S.D.	Mean	S.D.	*t*	*F*[1]
Read & Write (Continued)						
Breadth	3.00	1.46	3.29	1.62	0.78	N.S.
Remote	1.67	1.77	2.38	2.54	1.36	N.S.
Obvious	5.91	3.04	6.79	2.81	1.28	N.S.
Balance						
Fluency	6.58	2.70	6.95	3.89	0.47	N.S.
Flexibility	3.48	2.00	3.71	2.59	0.41	N.S.
Breadth	3.55	1.30	3.52	1.55	0.06	N.S.
Remote	2.18	1.80	1.74	2.17	0.93	N.S.
Obvious	4.42	2.07	5.21	2.98	1.28	N.S.
Total Fluency	22.27	7.87	24.36	9.03	1.04	N.S.
IDEATIONAL FLUENCY						
Drink	9.88	4.76	9.62	4.40	0.24	N.S.
Sweet	7.12	4.52	8.31	5.65	0.97	N.S.
Smooth	10.94	4.87	11.14	6.28	0.15	N.S.
Green	6.48	4.35	5.62	4.14	0.87	N.S.
Total	34.39	12.56	34.69	16.81	0.08	N.S.
SEEING PROBLEMS						
Hammer	3.00	1.30	2.48	1.26	1.74	N.S.
Wind	2.91	1.16	2.93	1.22	0.07	N.S.
Glue	3.09	1.36	2.90	1.19	0.62	N.S.

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[1] Two-Tailed test at 74 df

2. Differences in Achievement (Males vs. Females)

The results of the *t* tests reported in Table 17 indicate that there were no significant differences in achievement between males and females in either of the three groups of subjects.

TABLE 17

TESTS OF SIGNIFICANCE BETWEEN MEAN ACHIEVEMENT TEST SCORES OF MALE AND FEMALE SUBJECTS BY GROUP

TEST	Sighted Subjects					
	Males (N=40)		Females (N=36)			
	Mean	S.D.	Mean	S.D.	t	P[1]
Word Meaning	31.50	7.06	31.34	6.41	0.10	N.S.
Paragraph Meaning	38.00	7.04	37.40	8.29	0.33	N.S.
Arithmetic Application	17.20	4.46	16.77	4.13	0.42	N.S.

TEST	Day School Blind Subjects					
	Males (N=39)		Females (N=37)			
	Mean	S.D.	Mean	S.D.	t	P
Word Meaning	27.29	9.05	27.92	10.88	0.27	N.S.
Paragraph Meaning	37.89	12.87	38.43	11.19	0.19	N.S.
Arithmetic Application	15.79	7.06	15.81	7.26	0.01	N.S.

TEST	Residential School Blind Subjects					
	Males (N=34)		Females (N=42)			
	Mean	S.D.	Mean	S.D.	t	P
Word Meaning	24.85	9.89	27.38	10.10	1.07	N.S.
Paragraph Meaning	33.70	13.27	35.86	11.13	0.76	N.S.
Arithmetic Application	14.73	8.17	13.38	7.21	0.75	N.S.

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[1] Two-tailed test at 74 df

3. Differences in Mobility (Males vs Females)

The t tests performed to test for significant differences in mobility between males and females are reported in Table 18. In the day school blind group, the males were significantly more mobile in the classroom than were the females. There were no significant differences between day school blind males and females in mobility in the school and mobility on the schoolgrounds.

No significant differences in mobility between residential school blind males and females were found.

TABLE 18

TESTS OF SIGNIFICANCE BETWEEN MEAN MOBILITY SCORES OF DAY SCHOOL BLIND AND RESIDENTIAL SCHOOL BLIND MALES AND FEMALES

	Day School Blind Subjects					
Mobility Scale	Males (N=39)		Females (N=37)			
	Mean	S.D.	Mean	S.D.	t	P[1]
Classroom	5.89	1.37	1.57	2.70	8.67	.01
School	5.79	1.42	5.35	1.65	1.22	N.S.
Schoolground	5.13	1.69	4.68	1.88	1.09	N.S.

	Residential School Blind Subjects					
Mobility Scale	Males (N=34)		Females (N=42)			
	Mean	S.D.	Mean	S.D.	t	P[1]
Classroom	5.18	1.42	4.95	1.40	0.69	N.S.
School	4.70	1.29	4.64	1.54	0.16	N.S.
Schoolground	4.45	1.48	4.17	1.65	0.78	N.S.

[1] Two-tailed test at 74 df

E. Relationship Between School Achievement and Divergent Thinking

1. Sighted Subjects (Achievement and Divergent Thinking)

Correlations between the forty-one tests of divergent thinking and the three achievement measures for the sighted subjects are reported in Table 19. Correlations with Word Meaning ranged from -.09 to .57, with thirty-seven being significantly different from zero.

3. Differences in Mobility (Males vs Females)

The t tests performed to test for significant differences in mobility between males and females are reported in Table 18. In the day school blind group, the males were significantly more mobile in the classroom than were the females. There were no significant differences between day school blind males and females in mobility in the school and mobility on the schoolgrounds.

No significant differences in mobility between residential school blind males and females were found.

TABLE 18

TESTS OF SIGNIFICANCE BETWEEN MEAN MOBILITY SCORES OF DAY SCHOOL BLIND AND RESIDENTIAL SCHOOL BLIND MALES AND FEMALES

	Day School Blind Subjects					
	Males (N=39)		Females (N=37)			
Mobility Scale	Mean	S.D.	Mean	S.D.	t	P[1]
Classroom	5.89	1.37	1.57	2.70	8.67	.01
School	5.79	1.42	5.35	1.65	1.22	N.S.
Schoolground	5.13	1.69	4.68	1.88	1.09	N.S.

	Residential School Blind Subjects					
	Males (N=34)		Females (N=42)			
Mobility Scale	Mean	S.D.	Mean	S.D.	t	P[1]
Classroom	5.18	1.42	4.95	1.40	0.69	N.S.
School	4.70	1.29	4.64	1.54	0.16	N.S.
Schoolground	4.45	1.48	4.17	1.65	0.78	N.S.

[1] Two-tailed test at 74 df

E. Relationship Between School Achievement and Divergent Thinking

1. Sighted Subjects (Achievement and Divergent Thinking)

Correlations between the forty-one tests of divergent thinking and the three achievement measures for the sighted subjects are reported in Table 19. Correlations with Word Meaning ranged from -.09 to .57, with thirty-seven being significantly different from zero.

Twenty-eight of the divergent thinking - Paragraph Meaning correlations ranging from -.12 to .40, were significantly different from zero, while the range of correlation with Arithmetic Applications was .00 to .37 with six being significantly different from zero.

TABLE 19

CORRELATIONS BETWEEN ACHIEVEMENT TEST SCORES AND TESTS OF DIVERGENT THINKING FOR SIGHTED SUBJECTS (N=76)

Tests of Divergent Thinking	CORRELATIONS Word Meanings	 Paragraph Meanings	 Arithmetic Applications
WORD FLUENCY			
B	.27*	.13	.04
T	.32*	.29*	.14
Total	.34*	.24*	.10
PRODUCT IMPROVEMENT			
Fluency	.36*	.20	.11
Flexibility	.34*	.27*	.11
Originality	.28*	.17	.06
Elaboration	.38*	.22	.14
UNUSUAL USES			
Brick			
Fluency	.42*	.23*	.18
Flexibility	.40*	.23*	.20
Breadth	.35*	.24*	.12
Heat			
Fluency	.56*	.40*	.27*
Flexibility	.52*	.32*	.21
Breadth	.36*	.22	.24*
Water			
Fluency	.47*	.37*	.21
Flexibility	.43*	.36*	.20
Breadth	.43*	.38*	.22
Total Fluency	.57*	.39*	.26*

(Table 19 Continued on next page)

TABLE 19 (Continued)

Tests of Divergent Thinking	CORRELATIONS		
	Word Meaning	Paragraph Meanings	Arithmetic Applications
CONSEQUENCES			
Food			
Fluency	.38*	.26*	.18
Flexibility	.35*	.25*	.16
Breadth	.38*	.29*	.14
Remote	.29*	.22	.13
Obvious	.18	.11	.09
Read & Write			
Fluency	.39*	.31*	.21
Flexibility	.44*	.34*	.22
Breadth	.35*	.27*	.17
Remote	.28*	.20	.11
Obvious	.30*	.25*	.15
Balance			
Fluency	.34*	.22	.15
Flexibility	.48*	.32*	.19
Breadth	.37*	.23*	.25*
Remote	.38*	.37*	.11
Obvious	.14	.00	.10
Total Fluency	.43*	.30*	.21
IDEATIONAL FLUENCY			
Drink	.34*	.22	.22
Sweet	.33*	.24*	.13
Smooth	.42*	.38*	.37*
Green	.24*	.28*	.18
Total	.45*	.39*	.31*
SEEING PROBLEMS			
Hammer	-.09	-.12	.00
Wind	.26*	.23*	.09
Glue	-.04	.08	.02

*$p < .05$ at 74 d f

2. Day School Blind Subjects (Achievement and Divergent Thinking)

Table 20 contains the divergent thinking-achievement correlations for the day school blind subjects. Correlations between Word Meaning and divergent thinking ranged from .03 to .44. Twenty-six of these forty-one correlations were significantly different from zero. Correlation with Paragraph Meaning ranged from .08 to .41, with twenty-six being significantly different from zero; while twenty-seven of the Arithmetic Applications correlations were significantly different from zero. The range of correlations between Arithmetic Applications and divergent thinking was .09 to .40.

TABLE 20

CORRELATIONS BETWEEN ACHIEVEMENT TEST SCORES AND TESTS OF DIVERGENT THINKING FOR DAY SCHOOL BLIND SUBJECTS

(N=76)

Tests of Divergent Thinking	CORRELATIONS Word Meaning	Paragraph Meaning	Arithmetic Applications
WORD FLUENCY			
B	.32*	.27*	.30*
T	.22	.14	.35*
Total	.28*	.21	.35*
PRODUCT IMPROVEMENT			
Fluency	.20	.18	.21
Flexibility	.24*	.23*	.25*
Originality	.14	.17	.17
Elaboration	.14	.15	.16
UNUSUAL USES			
Brick			
Fluency	.21	.27	.17
Flexibility	.34	.34*	.23*
Breadth	.26*	.27*	.19
Heat			
Fluency	.20	.17	.21
Flexibility	.21	.16	.22
Breadth	.22	.19	.19
Water			
Fluency	.28*	.21	.24*
Flexibility	.34*	.31*	.28*
Breadth	.37*	.34*	.31*

(Table 20 Continued on next page)

TABLE 20 (Continued)

Tests of Divergent Thinking	CORRELATIONS		
	Word Meaning	Paragraph Meaning	Arithmetic Applications
UNUSUAL USES (Continued)			
Total Fluency	.27*	.25*	.25*
CONSEQUENCES			
Food			
Fluency	.19	.20	.26*
Flexibility	.27*	.31*	.32*
Breadth	.16	.17	.22
Remote	.42*	.31*	.40*
Obvious	.03	.08	.12
Read & Write			
Fluency	.36*	.33*	.32*
Flexibility	.44*	.28*	.34*
Breadth	.29*	.11	.22
Remote	.39*	.23*	.25*
Obvious	.21	.26*	.23*
Balance			
Fluency	.38*	.36*	.26*
Flexibility	.35*	.33*	.27*
Breadth	.40*	.41*	.38*
Remote	.33*	.33*	.31*
Obvious	.25*	.23*	.13
Total Fluency	.36*	.35*	.34*
IDEATIONAL FLUENCY			
Drink	.15	.18	.26*
Sweet	.17	.24*	.15
Smooth	.28*	.31*	.38*
Green	.38*	.27*	.33*
Total	.31*	.31*	.35*
SEEING PROBLEMS			
Hammer	.31*	.34*	.28*
Wind	.21	.14	.09
Glue	.44*	.38*	.40*

*$p < .05$ at 74 *d f*

3. Residential School Blind Subjects (Achievement and Divergent Thinking)

The correlations between the forty-one divergent thinking tests and the three achievement scores are reported in Table 21. Thirty-eight of the Word Meaning, twenty-six of the Paragraph Meaning and fourteen of the Arithmetic Applications correlations were significantly different from zero. Correlations ranged from .10 to .67, .06 to .48, and .02 to .44, respectively.

TABLE 21

CORRELATIONS BETWEEN ACHIEVEMENT TEST SCORES AND TESTS OF DIVERGENT THINKING FOR RESIDENTIAL SCHOOL BLIND SUBJECTS

(N=76)

Tests of Divergent Thinking	CORRELATIONS		
	Word Meaning	Paragraph Meaning	Arithmetic Applications
WORD FLUENCY			
B	.55*	.41*	.39*
T	.67*	.44*	.44*
Total	.64*	.45*	.44*
PRODUCT IMPROVEMENT			
Fluency	.38*	.21	.06
Flexibility	.34*	.17	.07
Originality	.32*	.14	.02
Elaboration	.45*	.27*	.13
UNUSUAL USES			
Brick			
Fluency	.34*	.21	.15
Flexibility	.43*	.32*	.22
Breadth	.50*	.44*	.36*
Heat			
Fluency	.50*	.33*	.12
Flexibility	.52*	.34*	.16
Breadth	.46*	.23*	.11
Water			
Fluency	.43*	.13	.13
Flexibility	.41*	.13	.17
Breadth	.44*	.22	.26*
Total Fluency	.51*	.27*	.16

(Table 21 Continued on next page)

TABLE 21 (Continued)

Tests of Divergent Thinking	CORRELATIONS		
	Word Meaning	Paragraph Meaning	Arithmetic Applications
CONSEQUENCES			
Food			
Fluency	.51*	.32*	.27*
Flexibility	.59*	.48*	.33*
Breadth	.42*	.34*	.22
Remote	.39*	.35*	.16
Obvious	.33*	.17	.21
Read & Write			
Fluency	.55*	.39*	.32*
Flexibility	.54*	.43*	.33*
Breadth	.52	.36*	.34*
Remote	.38*	.29*	.12
Obvious	.38*	.26*	.30*
Balance			
Fluency	.37*	.28*	.07
Flexibility	.38*	.31*	.02
Breadth	.38*	.29*	.03
Remote	.14	.18	.03
Obvious	.37*	.22	.08
Total Fluency	.57*	.40*	.27*
IDEATIONAL FLUENCY			
Drink	.35*	.23*	.20
Sweet	.26*	.09	.13
Smooth	.41*	.16	.20
Green	.10	.06	.14
Total	.38*	.18	.22
SEEING PROBLEMS			
Hammer	.12	.09	.15
Wind	.31*	.32*	.28*
Glue	.33*	.28*	.25*

* $p < .05$ at 74 df

F. Relationship between Mobility and Divergent Thinking

Correlations between mobility in the classroom, school, and school ground and the tests of divergent thinking for both blind groups are reported in Table 22. In the day school blind group, ten of the forty-one correlations between mobility in the classroom and tests of divergent thinking were significantly different from zero. These forty-one correlations ranged from .08 to .31. Correlations between divergent thinking and mobility in the school ranged from .03 to .33. Twenty-three of these were significantly different from zero. Seven of the correlations with mobility on the school grounds were significantly different from zero. These 41 correlations ranged from -.03 to .30.

In the residential blind group, correlations between divergent thinking scores and mobility in the classroom ranged from -.24 to .16, with two of these being significantly different from zero. No significant correlations with mobility in the school were found. These correlations ranged from -.18 to .21. The range of correlations with mobility on the school grounds was -.25 to .15, with only one being significantly different from zero.

TABLE 22

CORRELATIONS BETWEEN MOBILITY RATINGS AND TESTS OF DIVERGENT THINKING
(N=76 per group)

Divergent Thinking Tests	Mobility					
	Day Blind			Residential Blind		
	Class	School	School Ground	Class	School	School Ground
WORD FLUENCY						
B	.12	.32*	.27*	-.07	-.01	-.05
T	.09	.29*	.30*	-.17	-.14	-.19
Total	.11	.33*	.30*	-.12	-.08	-.12
PRODUCT IMPROVEMENT						
Fluency	.28*	.29*	.28*	-.01	-.03	..00
Flexibility	.21	.29*	.18	-.09	-.09	-.02
Originality	.31*	.14	.11	-.01	-.04	-.01
Elaboration	.31*	.30*	.27*	-.01	-.02	-.02

(Table 22 Continued on next page)

TABLE 22 (Continued)

Divergent Thinking Tests	Mobility					
	Day Blind			Residential Blind		
	Class	School	School Ground	Class	School	School Ground
UNUSUAL USES						
Brick						
Fluency	.27*	.26*	.21	..02	-.02	-.07
Flexibility	.29*	.30*	.21	-.03	-.04	-.07
Breadth	.27*	.28*	.22	-.06	.01	.02
Heat						
Fluency	.22*	.22	.08	-.13	-.12	-.19
Flexibility	.18	.15	.12	-.14	-.12	-.21
Breadth	.23*	.23*	.10	-.14	-.18	-.25*
Water						
Fluency	.11	.26*	.17	-.13	-.05	.00
Flexibility	.08	.17	.13	-.18	-.09	-.05
Breadth	.09	.15	.12	-.23*	-.11	-.07
Total Fluency	.23*	.29*	.17	-.10	-.07	-.10
CONSEQUENCES						
Food						
Fluency	.22	.28*	.18	-.06	-.01	-.06
Flexibility	.29*	.30*	.26*	-.07	.04	-.02
Breadth	.26*	.19	.13	-.01	.06	.02
Remote	.17	.30*	.26*	-.12	-.09	-.05
Obvious	.16	.17	.08	-.03	.00	-.07
Read & Write						
Fluency	.16	.28*	.19	-.01	.07	.04
Flexibility	.10	.23*	.18	-.22	-.15	-.09
Breadth	.08	.22	.16	-.15	-.09	-.05
Remote	.12	.23*	.21	-.24*	-.17	-.13
Obvious	.12	.20	.12	.16	.21	.15
Balance						
Fluency	.13	.22	.14	-.03	.02	-.05
Flexibility	.19	.19	.10	-.20	-.13	-.14
Breadth	.22	.12	.07	-.14	-.07	-.08
Remote	.01	.03	.03	-.08	.02	.02
Obvious	.14	.24*	.14	.02	.00	-.08
Total Fluency	.21	.32*	.21	-.04	.03	-.02

(TABLE 22 Continued on next page)

TABLE 22 (Continued)

Divergent Thinking Tests	Mobility					
	Day Blind			Residential Blind		
	Class	School	School Ground	Class	School	School Ground
IDEATIONAL FLUENCY						
Drink	.13	.04	-.03	-.11	-.10	-.08
Sweet	.08	.10	.09	-.15	-.11	-.10
Smooth	.12	.26*	.19	-.05	-.04	-.01
Green	.21	.11	.09	.04	.13	.15
Total	.17	.16	.11	-.09	-.05	-.01
SEEING PROBLEMS						
Hammer	.21	.10	.09	.13	.13	.10
Wind	-.08	.30*	.22	-.10	.02	.02
Glue	.17	.29*	.16	.00	.03	.00

*$p < .05$ at 74 *df*

G. Factor Analyses

The factor analyses, after rotation, yielded 12 factors for the sighted subjects, fifteen factors for the day school blind subjects, and fourteen factors for the residential school blind subjects. The variables and their factor loadings are reported in Appendixes E, F, and G, respectively, for the groups indicated above.

IV. DISCUSSION

A. Differences in Divergent Thinking

This section presents a discussion of differences found between the groups on the following tests of divergent thinking: (1) Word Fluency, (2) Product Improvement, (3) Unusual Uses, (4) Consequences, (5) Ideational Fluency, and (6) Seeing Problems. Each test will be discussed separately.

1. Word Fluency

It was found that day school blind children scored significantly higher than both sighted and residential school blind subjects on the two sub-tests and on total score of the Word Fluency Test. No differences existed between the residential blind subjects and sighted subjects.

This finding of greater fluency in the day school blind group is consistent with the findings of Payne (31), Maxfield (26), Lax (20), and Kenmore (18). This could have been due, in part, to environmental influences. Since these children were in daily contact with sighted children, competed with them, and strived to be accepted by them, it might be expected that they would rely heavily on their verbal productions to compensate for limitations in communication imposed by their blindness. It seems reasonable to believe that their verbalism would be reinforced by their sighted peers, as well as by adults with whom they interacted. Therefore, this "need to verbalize" would be strengthened. This would result in a greater quantity of verbal production which would be reflected in their word fluency scores. If this position is tenable, it could also account for the results of the comparisons made with the residential school blind. That is, the residential blind could be considered as operating in a "blind environment" in which there is less stimulation by sighted persons than if they were in a "sighted environment". Thus, the need or motivation to verbalize would not be so strong in the residential blind, which might affect their word fluency scores, accordingly.

It is also possible that the home environment of the blind subjects influenced the word fluency scores. For example, parents who insist that their blind children attend day schools, rather than institutions, may provide the type of home environment that fosters fluency.

2. Product Improvement

The sighted subjects scored significantly higher than the residential blind on all sub-tests of this item and significantly higher than the day school blind on the flexibility and originality dimensions. These differences could be a function of the test item itself. The test required that the student describe ways to improve the toy dog in order to make it more fun to play with. It is possible that sighted subjects were utilizing visual cues which triggered further responses, thus inflating their scores.

From the performance of the residential blind on this test, it might also be concluded that the blind subjects required a longer period of time to orient themselves to the dog stimulus. This would limit the number of responses they could make on this timed test. However, there does not appear to be support for this position when differences in the fluency and elaboration scores of the sighted and day blind subjects are examined. These indicate that the day school blind made as many responses as the sighted. Nevertheless, the lack of differences between the groups on these sub-tests could be due to the superior fluency of the day blind (as mentioned in the previous section), which would compensate for any penalty imposed by the time requirement of this test.

3. Unusual Uses

Of the thirty comparisons made on the Unusual Uses Tests, only four yielded significant differences, all of which were in favor of the sighted group. Sighted subjects scored significantly higher than the day and residential blind subjects on both the flexibility and breadth dimensions of the Brick sub-test. The breadth score on this sub-test reflected the number of different categories of uses named, and flexibility was determined by the number of shifts between different categories. It could be postulated that sighted subjects scored higher on these items because they have seen bricks used in different ways in their environment. This might be construed as an accumulation of incidental knowledge that would not be available to the blind by virtue of their visual handicaps.

It is interesting to note that the blind did not differ from the sighted on the fluency score of the Brick item. This is fairly consistent with the earlier fluency findings and indicates that the blind were inferior in the quality, but not quantity, of their responses.

There were no significant differences on the Heat sub-test. This item required that students indicate those things that might bring them comfort if they were hot. Since the item is related to basic body needs it would seem that sightedness, or its absence, would not differentially affect test performance.

4. Consequences

On the Food sub-test, the day school blind scored significantly higher than the sighted group in fluency and obvious responses. The residential school blind also scored significantly higher than the sighted group on obvious responses. Since blind children are deprived of the visual sense, it seems reasonable to believe that they would learn to be more aware of stimulation obtained through the other sensory channels. Since this item required a reaction to deprivation of the gustatory sensation, it would seem that blind children would have more obvious reactions than sighted children. If this is so, it would account for the greater number of obvious responses made by the blind subjects on this test,

The day school blind subjects scored significantly higher than the sighted subjects on the fluency dimension of the Reading and Writing sub-test. Here again, the day school blind were functioning in schools with sighted subjects where a premium is placed upon the ability to read and write. It is possible that the day school blind were over-identifying with this premium, thus inflating their fluency scores over those of their sighted peers.

The only significant difference on the Balance sub-test favored the residential blind over the day-school blind on the remote score. This may be due to a greater appreciation, on the part of the residential school subjects, for the more specific details of activities related to the sense of balance which are emphasized in residential school curriculums such as physical education, mobility training, and sports such as wrestling.

5. Ideational Fluency

Day school blind subjects scored significantly higher than sighted subjects on the Drink, Sweet, and Green sub-tests, and on the total Ideational Fluency score. Residential blind subjects scored significantly higher than the sighted subjects on the Green sub-test and on the total Ideational Fluency score. Thus, the greater fluency of the blind subjects was again in evidence.

The superiority of the day school blind group on the Drink and Sweet sub-tests could be explained by the relationship between the item and the gustatory sense, as was the case in Consequences-Food. That is, the blind may be more aware of different foods because they are more dependent upon this sensory channel for information purposes, than are sighted individuals.

Using the same rationale, one might predict that blind children would name more smooth items than would sighted children because of their greater dependence upon the tactile sense. This was not the case. However, the test administrators noted that many of the sighted children visually searched the testing rooms for smooth items which could have inflated their scores on the Smooth sub-test.

It is interesting to note that both groups of blind subjects scored significantly higher than the sighted subjects on the Green sub-test. It would seem that the opposite should hold because of the abstraction involved. That is, it is hard to conceive of blind children having more highly developed concepts of color. The observed differences, however, could be a reflection of the type of instruction which blind children receive. Since color is a difficult concept for the blind to learn, it is possible that teachers of the blind devote a great deal of time to the teaching of such abstractions in order to provide their students with as much sophistication in these concepts as possible. Also, the drive to be "like" the sighted might possibly motivate the blind to incorporate words related to the early developmental expectation of the sighted into their vocabularies, e.g., teaching children to name colors (8).

The above findings on the Smooth and Green sub-tests could also be explained by Harley's (13) findings. He found a significant negative correlation between experience and verbalism. Therefore, since the blind have had greater experience with smooth objects, they might be expected to be less verbal about them. Conversely, since they have had fewer direct experiences with the concept of "greenness", (being an abstraction) they might be expected to produce more verbal responses to this item.

6. Seeing Problems

Sighted children scored significantly higher than day school blind children on all three Seeing Problems sub-tests. For the Hammer and Glue sub-tests, this could be due to the sighted having more experience with these objects, particularly in the home (34). It seems logical that sighted children would not be subject to as many restrictions as blind children, both in terms of the ability to use a hammer and glue and in terms of the willingness of adult authority figures to permit their use. Because of this greater experience with the items, the sighted subjects would have had more opportunity to encounter problems and potential problems that might arise from their use.

The residential blind obtained significantly higher scores on the Hammer and Glue sub-tests than did the day blind subjects. In essence, the same rationale as above could be used to explain these findings. It is quite probable that the residential blind children had more experience with the objects than did the day school blind subjects. That is, the residential programs might be expected to have more manual arts activities while the day school programs, with the greater emphasis on academics, would offer fewer manual arts experiences. Thus, the residential blind would have had more experience than the day blind with hammers and glue, which would subsequently elevate their scores on these test items.

Sighted subjects scored significantly higher than both groups of blind subjects on the Wind sub-test. This could be due, in part, to the fact that this item is more abstract than the Hammer and Glue sub-test. In addition, their visual limitations could have influenced the blind subjects because they could only feel and hear the wind, but could not see its effects.

B. Differences in Achievement

It was found that sighted subjects scored significantly higher in Word Meaning Achievement than did both groups of blind subjects. This is consistent with the earlier findings of Hayes (14). Sighted subjects also scored significantly higher than residential blind subjects in Arithmetic Applications, but not higher than the day school blind. While differences in Arithmetic in favor of the sighted might be expected on the basis of the work by Hayes (15) and Nolan and Ashcroft (28), it is not known why the sighted were not significantly superior to the day school blind subjects in the present investigation. One possible explanation could be that arithmetic problems which required interpretations of visual displays (charts and graphs) were omitted from the tests that were administered. Therefore, the blind were not penalized for their inability to see.

C. Sex Differences

In every case where significant differences were found on tests of divergent thinking for both the sighted and day-school blind groups, these differences favored the males. The only instance of demonstrated superiority on tests of divergent thinking for the females was in the residential school group on the breadth dimension of the Unusual Uses - Brick subtest. This finding might be accounted for on the basis of its being a statistical chance finding, or by the fact that residential school females were significantly older and in significantly higher grade levels than were the residential school male subjects.

D. Age of Onset of Blindness

An attempt was made to examine differences which may have existed in the divergent thinking abilities of children according to varying ages of onset of blindness. The range of onset of blindness could not be anticipated prior to the selection of the sample. Consequently, there was no initial guarantee that this variable would be manifest in enough subjects of various onset ages to extract meaningful information.

It was found that, of the 152 blind subjects, 134 were congenitally blind, 10 were blinded between birth and one year of age, 3 became blind between the ages of one and five and 5 became blind after the age of five. In attempting to analyze these data, it was decided that an insufficient number of adventitiously blind subjects precluded the drawing of sound conclusions regarding the divergent thinking abilities of the blind subjects. This decision was further supported by the fact that many of the children in the birth to one-year onset range became blind within a few weeks or months of birth. The high incidence of congenitally blind children is explained by the etiological data which indicated that most of these subjects suffered retrolental fibroplasia.

E. Relationship between School Achievement and Divergent Thinking

The large number of correlations which were significantly different from zero would seem to indicate that a relationship exists between school achievement and divergent thinking. However, with 75 degrees of freedom, a correlation coefficient of .23 will allow one to state that the correlation differs significantly from zero. At the same time, it can be determined that only 5 per cent of the variance in one test is accounted for by the variance in its correlate. Therefore, it seems reasonable to suggest that, although a correlation of .23 may be statistically significant, it may not be psychologically significant.

Of the 369 correlations that were calculated, only 16 (4 per cent) were .50 or higher and all were correlations with Word Meaning. Of these, the sighted group accounted for 3, and the residential group accounted for the remaining 13. On an *a priori* basis, if high correlations between achievement and the verbal divergent thinking tests administered in this investigation would be expected, it might be predicted that the highest of these would be with word meaning because the tests were verbal in nature and subjects would be required to know the meaning of words in order to communicate with the examiner. Conversely, the lowest correlations would be expected with Arithmetic Applications since the Arithmetic sub-test could be construed as a measure of convergent, rather than divergent, thinking. The data seem to support these possibilities.

Other than the sixteen correlations mentioned above, the remaining 353 correlations were .49 or lower. Only 14 per cent of the total correlations were .40 or higher. Therefore, it seem reasonable to conclude that if a relationship exists between divergent thinking and school achievement, the relationship is a small one at best.

F. Relationship Between Mobility and Divergent Thinking

The point previously made with regard to achievement could be applied to the significant correlations found between mobility ratings and scores on the divergent thinking tests. A correlation of .33 was the highest obtained. With only 3 of the 123 correlations being significant for the residential blind group (the highest being - .24) it seems safe to conclude that there is very little relationship between mobility and divergent thinking of residential school blind children.

In the day school blind, it is interesting to observe that 16 of the 40 significant correlations were with fluency scores, with eleven of these being correlated with mobility in the school. No other pattern of correlations seemed to emerge. This is not surprising, since it was indicated earlier that the day blind were highest on fluency scores and were also higher than the residential school blind on mobility in the school. However, in keeping with the previous position, i. e., that correlations between .23 and .33 do not indicate a very strong relationship, the most that could be concluded would be that there seems to be a slight relationship between fluency and mobility in day school blind children.

G. Factor Analyses

Only factor loadings of plus or minus .30 were retained for the purpose of analyzing the results of the factor analyses (Appendixes E, F, and G). However, on examining the factors, it appeared that more meaningful information was available if the criterion for acceptable factor loadings was set at plus or minus .45 or greater. For example, factor loadings on the first factor which emerged for the sighted broup ranged from .33 to .93. However, the four Product Improvement scores had factor loadingsof .82 or higher. The next highest loading was .44, with various other scores receiving lower loadings. Similar patterns were observed on a number of the other factors. Therefore, it was concluded that the factors were more pure and could be more appropriately identified using the .45 cut-off point.

Using this criterion, the factors were identified for each group of subjects. Comparisons were made across groups to determine the types of factors which emerged and the ways in which the factors differed for each group. The names of the factors which emerged are presented in Table 23.

It is interesting to note, from Table 23, that the following factors emerged for all three groups:

Word Fluency, Product Improvement, Unusual Uses, Consequences, Ideational Fluency, Seeing Problems, Age, Achievement, and Sex.

In addition,the factors of Mobility, Etiology, and Acuity (totally blind as opposed to light perception) emerged for both of the blind groups. The only factor that was specific to a single group was age of onset in the day school blind.

Although there were differences across groups in the order in which the factors emerged, the apparent consistency in the types of factors which emerged prompted the conclusion that the dependent and independent variables were essentially independent from each other. That is, they were measures of different things. Since all six of the divergent thinking tests emerged in all of the groups, this would seem to add support to the claims of the authors of these tests that they are designed to measure different dimensions of divergent thinking. The fact that achievement and mobility factors were obtained for each group, also supports the contention made in previous sections that there is little relationship between these measures and divergent thinking.

TABLE 23

FACTORS OBTAINED FROM THE FACTOR ANALYSIS FOR EACH GROUP[1]

Factor	Sighted	Day Blind	Residential Blind
1	Product Improvement	Unusual Uses	Unusual Uses
2	Consequences	Age	Achievement
3	Age	Consequences	Product Improve.
4	Word Fluency	Mobility* Sex	Mobility
5	Ideational Fluency	Ideational Fluency	Consequences
6	Achievement	Product Improve.	Ideational Fluency
7	Seeing Problems* Consequences	Consequences	Consequences
8	Consequences	Mobility	Age
9	Unusual Uses Consequences	Word Fluency Seeing Problems	Etiology
10	Unusual Uses	Achievement	Unusual Uses
11	Unusual Uses Seeing Problems	Consequences Unusual Uses	Consequences
12	Sex	Etiology	Sex* Seeping Problems
13	------	Age of onset Consequences	Acuity* Seeing Problems
14	------	Unusual Uses Acuity	Word Fluency
15	------	Etiology	------

* Bi-polar Factor

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[1] Only Factors with loadings of ± 0.45 were retained for this analysis

V. CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

A. Conclusions

The conclusions which were reached are presented in this section according to the different objectives of the investigation.

1. Objective One:

To study the effects of visual deprivation upon verbal divergent thinking in blind children when compared with visually normal children.

Conclusion:

Because the tests of divergent thinking used in this investigation are measures of essentially different things, it was not possible to derive composite, or total, divergent thinking scores which were sums of the scores derived on all sub-tests. The results must, therefore, be presented on the basis of the performance of subjects on all of the scores which could be derived from each sub-test. Only when all of the **41** scores were examined was it possible to derive generalizations about the divergent thinking abilities of the three groups of subjects.

When the blind and sighted subjects were compared, it was found that the blind children scored significantly higher on 11 of the 41 scores while the sighted group scored significantly higher on 9 of the 41 scores. No differences were found between the two groups on the remaining 22 scores. The one consistent trend which emerged from these comparisons was that the blind children tended to be more verbally fluent than did their sighted counterparts. Aside from that, the few remaining differences which could be detected, seemed to be a function of visual deprivation and not due to inherent intellectual disparities.

Thus, it might be concluded that, (1) blind children exhibit more verbal fluency in the divergent thinking dimension of intelligence than do sighted children, (2) visual familiarity with the environment allows sighted children some advantage over the Blind, in a relatively small number of divergent thinking activities, and (3) more often than not, blind and sighted children, in the ten to twelve year age range, do not differ in the ability to think divergently.

2. Objective Two:

To study differences which may exist in the divergent thinking abilities of residential and day-school blind pupils.

Conclusion:

No differences were found between day school and residential school subjects on 34 of the 41 scores of divergent thinking. No logical pattern could be determined for the eight instances where differences did exist except for a slight tendency for the day-school blind children to be more fluent in their verbal productions then the residential school pupils. This minor difference in verbal fluency was explained on the basis of possible environmental differences in the two settings.

It might then be concluded that, in general, blind children, in the ten to twelve year age range, are equally capable of thinking divergently regardless of placement in either a residential or day-school setting.

3. Objective Three

To study differences which may exist in the divergent thinking abilities of children of varying ages of onset of blindness.

Conclusion:

No conclusion could be reached concerning the effect of varying ages of onset of blindness on the divergent thinking abilities of blind children because the sample did not generate sufficient meaningful data.

4. Objective Four

To study the relationship between divergent thinking ability and school achievement of blind children.

Conclusion:

There was very little relationship between school achievement and divergent thinking abilities of blind children. This conclusion can also be extended to the sighted children studied in this investigation.

5. Objective Five

To examine differences which may exist in the verbal divergent thinking abilities of both blind and sighted males and females.

Conclusion:

When sex differences appeared on the dimensions of divergent thinking, sighted and day-school blind males tended to be more divergent than their female classmates.

6. Objective Six

To examine the relationship between mobility and the divergent thinking abilities of blind children.

Conclusion:

Mobility and the divergent thinking abilities of blind children appeared to be unrelated.

B. Implications

1. The primary implication which might be drawn from this investigation is basically supportive of other research already completed. That is that blindness suppresses interaction with the sighted environment in which the blind are expected to function. This has further implications for the traditional lack of agreement regarding the performance of the blind on tests of intelligence. The conclusions presented in this study are consistent with the viewpoint that lack of visual contact with the environment, as opposed to inherent intellectual disabilities, is responsible for differences found in the assessment of cognitive and conceptual abilities of blind and sighted persons.

2. Related to the first implication is the notion that compensatory education is required to offset the limitations which blindness places upon a person's opportunities for environmental interaction. Conclusion number one, above, supports the idea that educational objectives for the blind person should be the same as those for the sighted. In attempting to reach these objectives, however, every effort must be made to broaden the experiences of the blind in order to offset the effects of visual deprivation.

3. The present findings indicate that male pupils tend to exhibit superior divergent thinking capabilities over their female classmates. This could imply a need for special consideration for girls when curricular planning takes place in those subjects and activities in which divergent thinking skill is required.

4. It has been reported previously that highly divergent thinkers appear to be more willing to "take risks" than do low divergent thinkers. At the same time, it was thought by the present investigators that highly mobile blind children might also be greater risk takers and, therefore, score higher on divergent thinking tests. This was not found to be the case. One implication of this result might be that the risk-taking behavior associated with divergent thinking is a different type or quality from that involved in physical mobility. A common emotional factor may be important in the further study of this phenomenon.

C. Recommendations

1. The results of this investigation lead to a practical recommda-tion for the logistics of research with blind persons. It is that very large numbers of subjects are needed in studies which incorporate the age of onset of blindness as a research variable of secondary importance and where, therefore, they are not selected for study on the basis of that particular factor.

2. Because of the exploratory nature of this study, more questions may have been raised than were answered. If that is the case, a significant goal of this research has been accomplished. Related to this goal, however, is the recommendation that additional research on divergent thinking should be conducted in order to determine how this ability might be fostered, as well as to determine its practical application for school programs for blind children.

VI. SUMMARY

The purpose of this investigation was to study the influence of visual deprivation upon the divergent Thinking dimension of intelligence. Divergent thinking was defined as that kind of thinking in which new information, or new combinations of ideas, are generated out of given or known information and which represents a respondent's performance on verbal measures of originality, fluency of ideas, flexibility of thought and elaboration of ideas.

In order to carry out the purpose of the investigation, the following research objectives were pursued:

1. To study the effects of visual deprivation upon verbal divergent thinking in blind children when compared with visually normal children.
2. To study differences which may exist in the divergent thinking abilities of residential and day-school blind pupils.
3. To study differences which may exist in the divergent thinking abilities of children of varying ages of onset of blindness.
4. To study the relationship between divergent thinking ability and the school achievement of blind children.
5. To examine differences which may exist in the divergent thinking abilities of both blind and sighted males and females.
6. To examine the relationship between mobility and the divergent thinking abilities of blind children.

The sample of subjects consisted of 76 sighted children, 76 blind children enrolled in day-school programs, and 76 blind children in residential schools. For purposes of this investigation, blindness was defined as possessing visual acuity of light perception or less. The sample was drawn from pupils in 18 day-school programs and five residential schools in the Eastern half of the United States. All subjects were of average or above average intelligence and were between ten and twelve years of age.

Six tests of divergent thinking were administered individually to all subjects. These tests were Word Fluency, Product Improvement, Unusual Uses, Consequences, Ideational Fluency, and Seeing Problems. A brief pilot study found that blind subjects were capable of providing meaningful and relevant responses to these verbal tests of divergent thinking. Revised scoring criteria were used in reaching inter-scorer agreement of better than 85% on all tests and sub-tests.

School Achievement was measured by administering the Word Meaning, Paragraph Meaning, and Arithmetic Applications sub-tests of the Stanford Achievement Test (1964 revision). Teachers of the blind subjects completed a seven point mobility rating scale which yielded scores on mobility in the classroom, in the school, and on the school grounds.

Statistical analyses of the data included the t test to examine differences between groups, correlations to analyze the relationships between variables, and factor analysis to determine the interrelationships among the dependent and independent variables. All analyses were performed using raw score data.

The major findings of this investigation led to the following general conclusions:

1. Blind children exhibit more verbal fluency in the divergent thinking dimension of intelligence than do sighted children.

2. Visual familiarity with the environment allows sighted children some advantage over the blind in a relatively small number of divergent thinking activities.

3. More often than not, blind and sighted children in the ten to twelve year age range do not differ in the ability to think divergently.

4. In general, blind children are equally capable of thinking divergently regardless of placement in a residential or day-school setting.

5. It was not possible to reach a conclusion concerning the effect of varying ages of onset of blindness upon the divergent thinking abilities of blind children because the sample used in this study did not generate sufficient meaningful data.

6. There is very little relationship between school achievement and divergent thinking abilities of blind children. This conclusion can also be extended to the sighted children studied in this investigation.

7. When sex differences appear on the dimensions of divergent thinking, sighted and day-school blind males tend to be more divergent than their female classmates.

8. Mobility and the divergent thinking abilities of blind children appear to be unrelated.

The following implications were drawn from the findings and conclusions of this investigation:

1. Blindness suppresses interaction with the sighted environment in which the Blind are expected to function.

2. Compensatory education and the general broadening of experiences are required to offset the limitations which blindness places upon a person's opportunities for interaction with the environment.

3. There seems to be a need for special curricular planning for girls in those subjects and activities in which divergent thinking skill is required.

4. The risk-taking behavior associated with divergent thinking seems to be of a different type or quality from that involved in physical mobility of the Blind. A common emotional factor may be important in the further study of this phenomenon.

The present research effort led to the following two recommendations:

1. Very large numbers of subjects are needed in studies which incorporate the age of onset of blindness as a research variable of secondary importance and where, therefore, they are not selected for study on the basis of that particular factor.

2. Because of the exploratory nature of this study, further research on divergent thinking should be conducted in order to determine how this ability might be fostered, as well as to determine its practical application for school programs for blind children.

REFERENCES

1. Ashcroft, S. C. Blind and Partially Seeing Children. In L. M. Dunn (Ed.) *Exceptional Children in the Schools.* New York: Holt Rinehart and Winston, Inc., 1963, 413-461.

2. Bauman, Mary K. and Yoder, N. M. *Placing the Blind and Visually Handicapped in Professional Occupations.* Washington: U. S. Office of Vocational Rehabilitation, 1962.

3. Bendig, A. W. *Normalized Varimax Factor Rotation Program.* University of Pittsburgh. Computation Center, undated.

4. Bendig, A. W. *Principal Components Analysis.* University of Pittsburgh; Computation Center, undated.

5. Christensen, P. R., and Guilford, J. P. *Ideational Fluency.* Beverly Hills: Sheridan Supply Company, 1957.

6. Christensen, P. R., and Guilford, J. P. *Word Fluency.* Beverly Hills: Sheridan Supply Company, 1958.

7. Christensen, P. R., Merrifield, P. R., and Guilford, J. P. *Consequences.* Beverly Hills: Sheridan Supply Company, 1958.

8. Cutsforth, T. D. *The Blind in School and Society.* New York: American Foundation for the Blind, 1951.

9. Deutsch, F. The Sense of Reality in Persons Born Blind, *J. of Psychol.*, X, 1940, pp. 121-140.

10. Guilford, J. P. *Fundamental Statistics in Psychology and Education.* New York: McGraw-Hill, 1956.

11. Guilford, J. P. Traits of Creativity. In H. H. Anderson (Ed.) *Creativity and its Cultivation.* New York: Harper, 1959, 142-161.

12. Guilford, J. P. *The Structure of Intellect Model: Its Uses and Implications.* University of Southern California Report from the Psychological Laboratory, April, 1960.

13. Harley, R. K. *Verbalism Among Blind Children.* New York: American Foundation for the Blind, 1963.

14. Hayes, S. P. Words are Wise Men's Counters: How Rich are the Blind?, Teachers Forum. 1938, 10, 94-103, 108.

15. Hayes, S. P. Contributions to a Psychology of Blindness. New York: American Foundation for the Blind, 1941.

16. Hunt, J. McV. Intelligence and Experience. New York: The Ronald Press, 1961.

17. Jones, J. W. Problems in Defining and Classifying Blindness. Research Bulletin Number 3, New York: American Foundation for the Blind, August, 1963, 123-29.

18. Kenmore, Jeanne R. Associative Learning by Blind versus Sighted Children with Words and Objects Differing in Meaningfulness and Identifiability Without Vision. Unpublished doctoral dissertation, University of Minnesota, 1965.

19. Kirk, S. A. Educating Exceptional Children. Boston: Houghton Mifflin Co., 1962, 123-129.

20. Lax, B. A. A Comparison of the Imaginative Productions of Congenitally Blind and Seeing Children to Structured Auditory Stimulation. Unpublished master's thesis, University of Texas, 1953.

21. Lowenfeld, B. Psychological Problems of Children with Impaired Vision, In W. M. Cruickshank (Ed.), Psychology of Exceptional Children and Youth. Englewood Cliffs, N. J.: Prentice-Hall, 1963, 226-310.

22. Lowenfeld, V. Creative and Mental Growth. New York: MacMillan, 1952.

23. Lowenfeld, V. What is Creative Teaching? In E. P. Torrance (Ed.) Creativity: Proceedings of the Second Minnesota Conference on Gifted Children. Minneapolis: University of Minnesota Press, 1959, 38-50.

24. Lukoff, I. F. and Whiteman, M. Intervening Variables and Adjustment: An Empirical Demonstration. Research Bulletin Number 3, New York: American Foundation for the Blind, August, 1963, 55-65.

25. MacKinnon, D. W. Conditions for Effective Personality Change. Paper read at the Seventh ASCD Curriculum Research Institute, Portland, Oregon, April 28, 1962.

26. Maxfield, K. E. The Spoken Language of the Blind Pre-School Child, *Archives of Psychology*. 1936, *29*, No. 201, 53.

27. Mc Andrews, H. Rigidity and Isolation: A Study of the Deaf and the Blind, *Journal of Abnormal and Social Psychology*. 1948, *43*, 479-494.

28. Nolan, C. Y. and Ashcroft, S. C. The Stanford Achievement Arithmetic Computation Tests: A Study of an Experimental Adaptation for Braille Administration, *International Journal for the Education of the Blind*, 1959, *8*, 89-92.

29. Norris, Miriam, Spaulding, Patricia J., and Brodie, Fern H. *Blindness in Children.* Chicago: The University of Chicago Press, 1957.

30. Norris, Miriam *The School Age Blind Child Project.* New York: American Foundation for the Blind, Educational Series No. 13, 1961.

31. Payne, Sarah . Free Association in Blind Children. Unpublished master's thesis, Columbia University, 1931.

32. Reid, J. B., King, F. J., and Wickwire, P. Cognitive and Other Personality Characteristics of Gifted Children, *Psychological Reports*, 1959, *5*, 729-737.

33. Seeing Problems Test, Aptitudes Research Project, Department of Psychology, University of Southern California, Los Angeles, California, Undated.

34. Tillman, M. H. Performance of Blind and Sighted Children on the Wechsler Intelligence Scale for Children: Study I, *International Journal for the Education of the Blind*, 1967, *16*, 65-74.

35. Tisdall, W. J. Productive Thinking in Retarded Children, *Exceptional Children*. 1962, 29, 36-41.

36. Torrance, E. P. , Yamamoto, K., Schenitzki, D., Palamutlu, N., and Luther, B. *Assessing the Creative Thinking Abilities of Children.* Minneapolis: Bureau of Educational Research, University of Minnesota, 1960.

37. Torrance, E. P. and Palamutlu, N. Product Improvement Task. In E. P. Torrance, K. Yamamoto, D. Schenetzki, N. Palamutlu, and B. Luther. *Assessing the Creative Thinking Abilities of Children.* Minneapolis: Bureau of Educational Research, University of Minnesota, 1960, 99-127.

38. Torrance, E. P. *Guiding Creative Talent*. Englewood Cliffs, N. J.: Prentice-Hall, 1962.

39. Torrance, E. P. *Education and The Creative Potential.* Minneapolis: University of Minnesota Press, 1963.

40. Toth, Z. *Die Vorstellungswelt Der Blinden.* Leipzig: Johann Ambrosius Barth, 1930.

41. Unusual Uses Test Aptitudes Research Project, Department of Psychology, University of Southern California, Los Angeles, California, Undated.

42. Wilson, R. C., Guilford, J. P., and Christensen, P. R. The Measurement of Individual Differences in Originality, *Psychology Bulletin,* 1953, *50*, 362-70.

43. Worchel, P. Space Perception and Orientation in the Blind. *Psychology Monographs,* 1951, *65*, No. 15.

APPENDIX A

DISTRIBUTION OF SUBJECTS ACCORDING TO SCHOOL

1. Day School Blind Subjects

A. Florida	Males	Females	Total
Amelia Earhart School Hialeah	0	2	2
Bayside School Tampa	0	2	2
Biscayne Gardens School Miami	3	0	3
Hialeah Jr. High School Hialeah	1	0	1
Riviera School Miami	1	2	3
Seminole School Tampa	0	1	1
Tropical Elementary School Miami	1	0	1
West Miami Jr. High School Miami	1	0	1
B. Michigan			
Adams Elementary School Livonia	1	1	2
Baldwin School Pontiac	0	1	1
Harvey H. Lowrey School Dearborn	1	1	2

(Continued on next page)

B. Michigan (Continued)	Males	Females	Total
Lockman School Royal Oak	4	2	6
Marquette School Detroit	2	1	3
Mixter Elementary School Lincoln Park	3	1	4
Monnier School Detroit	1	1	2
Pitcher School Detroit	0	2	2
Riley Jr. High School Livonia	0	2	2
C. New York			
P. S. 6 New York City	0	1	1
P. S. 90 New York City	1	1	2
P. S. 133 Queens	1	1	2
P. S. 157 New York City	1	0	1
P. S. 163 New York City	1	1	2
P. S. 179 Flushing	1	0	1
P. S. 199 Brooklyn	2	0	2

(Continued on next page)

C. New York (Continued)	Males	Females	Total
Jr. High 194 Whitestone	0	1	1
D. **Ohio**			
Beaumont Elementary School Columbus	1	0	1
Berwick Elementary School Columbus	0	1	1
Clinton Jr. High School Columbus	1	0	1
Dennis Smith School Canton	2	2	4
Glenmont School Columbus	1	2	3
E. **Pennsylvania**			
Cumberland Hills School North Hills	2	0	2
De Paul Institute Pittsburgh	2	2	4
Jo Anna Connell School Erie	1	2	3
Logan School Philadelphia	3	4	7
TOTAL DAY SCHOOL BLIND SUBJECTS	39	37	76

2. Residential School Blind Subjects	Males	Females	Total
North Carolina State School for the Blind and the Deaf Raleigh, North Carolina	6	10	16
Ohio State School for the Blind Columbus, Ohio	14	13	27
Perkins School for the Blind Watertown, Massachusetts	5	11	16
Tennessee State School for the Blind Donelson, Tennessee	9	8	17
TOTAL RESIDENTIAL SCHOOL BLIND SUBJECTS	34	42	76

3. Sighted Subjects	Males	Females	Total
Warren Public Schools Warren, Pennsylvania	40	36	76

APPENDIX B
DATA SHEET
COOPERATIVE RESEARCH PROJECT
DIVERGENT THINKING IN BLIND CHILDREN
UNIVERSITY OF PITTSBURGH

Name of Child ______________________________ ID ______ Sex ______

Name of School ____

School Address ____

Name of Teacher ____

Type of School Res. ________________ Day ________________

Type of Program Resource __________ Special Class ________________

Itinerant________ Other ________ Grade in School______

Date of DT Test ____________________ Date of Birth __________ CA ______

IQ __________ Test ________________ MA ______________ as of 1 / 65

Visual Data

Acuity R __________ L __________ Both __________

Etiology (Pathology) ____________________________

Age of Onset ____________________________________

Number of years in residential school ____________________________

Number of years in day school ____________________________________

Comments:

APPENDIX C

SPECIAL DIRECTIONS FOR ADMINISTRATION OF STANFORD ACHIEVEMENT TESTS

UNIVERSITY OF PITTSBURGH

Program in Special Education and Rehabilitation

DIVERGENT THINKING IN BLIND CHILDREN

Only the subtests, Word Meaning, Paragraph Meaning, and Arithmetic Applications will be given. This should take approximately 75 minutes. When possible, the number of sittings should be held to one, with appropriate rest breaks.

These tests may be administered individually or by group. If the subject responds orally the examiner should use the test booklet to record his response. In the case of braille response by the subject, the examiner should be cautious that each response is identified with a question. Omissions, corrections, etc., should be plainly indicated in the case of the braille response.

Since scoring keys will not be furnished, the examiner need not score the tests. The project staff will be responsible for scoring. However, each subject's responses must be accompanied by the identifying information called for on the test booklet.

The Word Meaning and Paragraph Meaning subtests are to be given as is. In the Arithmetic Applications omit items 12, 13, 14, 30, 31, 32, 34 38, and 39.

All test scores will be returned to participating schools for their information and use.

WJT/bvo

APPENDIX D

MOBILITY SCALE

Cooperative Research Project
Divergent Thinking in Blind Children
University of Pittsburgh

____
Name of Child

To The Teacher

An important part of this investigation is the determination of relationships which may exist between divergent thinking and the child's independence in mobility. We would, therefore, like you to complete the four brief scale items below.

Please circle the one appropriate number on each of the four scales. If the child is superior in mobility, circle number 7. If the child is very poor, circle number 1. Or, circle the number between 7 and 1 which best describes his mobility.

In each case superior (7) means: independent, purposeful movement; needs no assistance in finding objects, locating places, etc.

In each case very poor (1) means: dependent, confused movement; needs constant supervision and aid in finding objects, locating places, etc.

	Superior						Very Poor
Mobility In the classroom:	7	6	5	4	3	2	1
Mobility In the school building:	7	6	5	4	3	2	1
Mobility On the school grounds:	7	6	5	4	3	2	1
Mobility In the community:	7	6	5	4	3	2	1

APPENDIX E

ROTATED FACTORS FOR SIGHTED SUBJECTS

Factor 1

Variable	Rotated Factor Loading
Product Improvement Originality	93
Product Improvement Fluency	88
Product Improvement Elaboration	86
Product Improvement Flexibility	82
Unusual Uses Fluency (Water)	44
Consequences Remote (Read & Write)	43
Consequences Total Fluency	42
Consequences Remote (Food)	38
Consequences Fluency (Food)	37
Consequences Fluency (Balance)	36
Unusual Uses Flexibility (Water)	33

Factor 2

Variable	Rotated Factor Loading
Consequences Obvious (Read and Write)	87
Consequences Fluency (Read and Write)	80
Consequences Total Fluency	79
Consequences Obvious (Balance)	76
Consequences Obvious (Food)	72
Consequences Fluency (Food)	64
Consequences Fluency (Balance)	62
Consequences Flexibility (Balance)	45
Ideational Fluency (Smooth)	41
Consequences Breadth (Balance)	40
Ideational Fluency (Drink)	39
Consequences Breadth (Read and Write)	37
Consequences Flexibility (Read and Write)	36
Consequences Fluency (Total)	33
Consequences Flexibility (Food)	33
Ideational Fluency Total	32
Unusual Uses Fluency (Brick)	31

Factor 3

Variable	Rotated Factor Loading
Grade	95
Years in School	95
Chronological Age	89

Factor 4

Variable	Rotated Factor Loading
Word Fluency Total	92
Word Fluency B Sub-test	82
Word Fluency T Sub-Test	80
I. Q.	39
Mental Age	35
Consequences Fluency (Food)	33

Factor 5

Variable	Rotated Factor Loading
Ideational Fluency (Sweet)	85
Ideational Fluency (Total)	81
Ideational Fluency (Green)	78
Ideational Fluency (Drink)	56
Ideational Fluency (Smooth)	33

Factor 6

Variable	Rotated Factor Loading
Paragraph Meaning	80
Mental Age	77
I. Q.	72
Arithmetic Applications	71
Word Meaning	66
Ideational Fluency (Smooth)	30

Factor 7

Variable	Rotated Factor Loading
Seeing Problems (Hammer)	68
Seeing Problems (Glue)	59
Consequences Flexibility (Balance)	-52
Consequences Breadth (Balance)	-51
Consequences Remote (Balance)	-43
Consequences Fluency (Balance)	-41

Factor 8

Variable	Rotated Factor Loading
Consequences Breadth (Read and Write)	72
Consequences Flexibility (Read and Write)	72
Consequences Remote (Read and Write)	67
Consequences Flexibility (Food)	53
Consequences Breadth (Food)	51
Consequences Remote (Food)	45
Consequences Fluency (Food)	43
Consequences Remote (Balance)	42
Unusual Uses Breadth (Water)	36
Unusual Uses Flexibility (Water)	33
Unusual Uses Fluency (Water)	32
Consequences Total Fluency	31
Unusual Uses Fluency (Heat)	31

Factor 9

Variable	Rotated Factor Loading
Unusual Uses Breadth (Brick)	-82
Unusual Uses Flexibility (Brick)	-81
Unusual Uses Fluency (Brick)	-65
Consequences Remote (Food)	-52
Consequences Breadth (Food)	-43
Consequences Fluency (Total)	-40
Consequences Flexibility (Food)	-38
Consequences Remote (Balance)	-35
Consequences Fluency (Balance)	-33
Consequences Breadth (Balance)	-31
Ideational Fluency (Drink)	-31

Factor 10

Variable	Rotated Factor Loading
Unusual Uses Breadth (Heat)	72
Unusual Uses Flexibility (Heat)	65
Unusual Uses Fluency (Heat)	52
Ideational Fluency (Smooth)	43
Unusual Uses Total Fluency	40
Unusual Uses Fluency (Brick)	32

Factor 11

Variable	Rotated Factor Loading
Unusual Uses Breadth (Water)	76
Unusual Uses Flexibility (Water)	75
Unusual Uses Fluency (Water)	59
Seeing Problems (Wind)	49
Consequences Flexibility (Balance)	35
Consequences Breadth (Balance)	33
Seeing Problems (Glue)	33

Factor 12

Variable	Rotated Factor Loading
Sex	85
Consequences Obvious (Food)	32
Ideational Fluency (Smooth)	-31

APPENDIX F

ROTATED FACTORS FOR DAY SCHOOL BLIND SUBJECTS

Factor 1

Variable	Rotated Factor Loading
Unusual Uses Breadth (Brick)	72
Unusual Uses Flexibility (Brick)	67
Unusual Uses Breadth (Heat)	61
Unusual Uses Fluency (Brick)	60
Unusual Uses Fluency (Total)	50
Unusual Uses Flexibility (Heat)	50
Unusual Uses Fluency (Heat)	49
Consequences Remote (Read and Write)	41
Seeing Problems (Hammer)	46
Consequences Breadth (Read and Write)	33
Seeing Problems (Glue)	32

Factor 2

Variable	Rotated Factor Loading
Years in School	84
Chronological Age	83
Grade	82
Word Meaning	52

Factor 3

Variable	Rotated Factor Loading
Consequences Obvious (Food)	87
Consequences Fluency (Food)	83
Consequences Obvious (Read and Write)	79
Consequences Total Fluency	70
Consequences Fluency (Read and Write)	64
Consequences Flexibility (Food)	44
Product Improvement (Flexibility)	37
Unusual Uses Fluency (Heat)	37
Unusual Uses Fluency (Total)	35

Factor 4

Variable	Rotated Factor Loading
Mobility (Classroom)	84
Sex	-84

Factor 5

Variable	Rotated Factor Loading
Ideational Fluency (Total)	87
Ideational Fluency (Sweet)	79
Ideational Fluency (Drink)	72
Ideational Fluency (Green)	67
Ideational Fluency (Smooth)	64
Unusual Uses Fluency (Total)	31

Factor 6

Variable	Rotated Factor Loading
Product Improvement (Elaboration)	86
Product Improvement (Originality)	85
Product Improvement (Fluency)	83
Product Improvement (Flexibility)	58
Unusual Uses Fluency (Total)	32
Unusual Uses Fluency (Heat)	31

Factor 7

Variable	Rotated Factor Loading
Consequences Breadth (Food)	-77
Consequences Remote (Food)	-72
Consequences Breadth (Read and Write)	-69
Consequences Flexibility (Read and Write)	-69
Consequences Flexibility (Food)	-61
Consequences Remote (Read and Write)	-49
Unusual Uses Breadth (Water)	-35
Consequences Fluency (Read and Write)	-32
Unusual Uses Flexibility (Water)	-31

Factor 8

Variable	Rotated Factor Loading
Mobility (Schoolground)	86
Mobility (School)	84

Factor 9

Variable	Rotated Factor Loading
Word Fluency (Total)	76
Word Fluency (T Sub-test)	72
Word Fluency (B Sub-test)	71
Seeing Problems (Glue)	60
Seeing Problems (Wind)	42
Seeing Problems (Hammer)	38

Factor 10

Variable	Rotated Factor Loading
I. Q.	-85
Mental Age	-79
Paragraph Meaning	-69
Word Meaning	-67
Arithmetic Applications	-66
Consequences Remote (Balance)	-36
Consequences Breadth (Balance)	-33
Grade	-32
Consequences Fluency (Read and Write)	-30

Factor 11

Variable	Rotated Factor Loading
Consequences Fluency (Balance)	-83
Consequences Obvious (Balance)	-81
Consequences Flexibility (Balance)	-80
Consequences Breadth (Balance)	-69
Unusual Uses Flexibility (Heat)	-48
Unusual Uses Fluency (Heat)	-45
Unusual Uses Fluency (Total)	-43
Unusual Uses Breadth (Heat)	-42
Consequences Total Fluency	-40
Unusual Uses Flexibility (Water)	-35
Unusual Uses Fluency (Water)	-34

Factor 12

Variable	Rotated Factor Loading
Etiology (Sight-type Classification)	81
Seeing Problems (Wind)	39
Unusual Uses Flexibility (Heat)	-30

Factor 13

Variable	Rotated Factor Loading
Age of Onset	80
Consequences Remote (Balance)	57
Consequences Remote (Read and Write)	37

Factor 14

Variable	Rotated Factor Loading
Unusual Uses Breadth (Water)	71
Unusual Uses Fluency (Water)	70
Unusual Uses Flexibility (Water)	69
Acuity	58
Unusual Uses Fluency (Total)	41

Factor 15

Variable	Rotated Factor Loading
Etiology (Structural Classification)	82
Acuity	-46
Seeing Problems (Hammer)	38

APPENDIX G

ROTATED FACTORS FOR RESIDENTIAL SCHOOL BLIND SUBJECTS

Factor 1

Variable	Rotated Factor Loading
Unusual Uses Flexibility (Brick)	80
Unusual Uses Fluency (Brick)	77
Unusual Uses Breadth (Heat)	75
Unusual Uses Flexibility (Heat)	75
Unusual Uses Breadth (Brick)	74
Unusual Uses Fluency (Total)	70
Unusual Uses Fluency (Heat)	68
Seeing Problems (Hammer)	36
Ideational Fluency (Smooth)	36
Consequences Fluency (Food)	33
Ideational Fluency (Sweet)	32
Unusual Uses Breadth (Water)	32
Unusual Uses Fluency (Water)	31
Consequences Total Fluency	31

Factor 2

Variable	Rotated Factor Loading
Paragraph Meaning	84
Mental Age	83
I. Q.	81
Arithmetic Applications	78
Word Meaning	68
Grade	55
Breadth (Brick)	38
Chronological Age	35
Word Fluency (Total)	34
Word Fluency (B Sub-test)	33
Consequences Obvious (Read and Write)	33
Years in School	33
Consequences Flexibility (Read and Write)	33
Consequences Fluency (Read and Write)	32
Word Fluency (T Sub-test)	31

Factor 3

Variable	Rotated Factor Loading
Product Improvement (Fluency)	92
Product Improvement (Originality)	90
Product Improvement (Elaboration)	88
Product Improvement (Flexibility)	74
Ideational Fluency (Drink)	31

Factor 4

Variable	Rotated Factor Loading
Mobility (School)	97
Mobility (Schoolground)	91
Mobility (Classroom)	88

Factor 5

Variable	Rotated Factor Loading
Consequences Remote (Food)	77
Consequences Breadth (Food)	71
Consequences Flexibility (Read and Write)	62
Consequences Remote (Read and Write)	61
Consequences Flexibility (Food)	58
Consequences Breadth (Read and Write)	53
Age of Onset	42
Consequences Fluency (Food)	32
Consequences Fluency (Read and Write)	32

Factor 6

Variable	Rotated Factor Loading
Ideational Fluency (Total)	83
Ideational Fluency (Sweet)	69
Ideational Fluency (Green)	69
Ideational Fluency (Drink)	64
Ideational Fluency (Smooth)	55

Factor 7

Variable	Rotated Factor Loading
Consequences Flexibility (Balance)	-80
Consequences Fluency (Balance)	-78
Consequences Remote (Balance)	-78
Consequences Breadth (Balance)	-73
Consequences Total Fluency	-56
Consequences Remote (Read and Write)	-46
Consequences Obvious (Balance)	-42
Consequences Flexibility (Read and Write)	-39
Consequences Fluency (Read and Write)	-38
Consequences Breadth (Read and Write)	-37

Factor 8

Variable	Rotated Factor Loading
Years in School	-70
Chronological Age	-64
Grade	-49
Consequences Obvious (Food)	-37

Factor 9

Variable	Rotated Factor Loading
Etiology (Structural Classification)	79
Etiology (Sight-type Classification)	73

Factor 10

Variable	Rotated Factor Loading
Unusual Uses Flexibility (Water)	-86
Unusual Uses Fluency (Water)	-81
Unusual Uses Breadth (Water)	-80
Unusual Uses Fluency Total	-46
Age of Onset	34
Unusual Uses Fluency (Food)	-34
Unusual Uses Obvious (Food)	-30

Factor 11

Variable	Rotated Factor Loading
Consequences Obvious (Read and Write)	-75
Consequences Obvious (Food)	-67
Consequences Fluency (Food)	-58
Consequences Fluency (Read and Write)	-53
Consequences Total Fluency	-52
Consequences Flexibility (Food)	-38

Factor 12

Variable	Rotated Factor Loading
Sex	-69
Seeing Problems (Hammer)	61
Consequences Obvious (Balance)	-46
Seeing Problems (Glue)	44

Factor 13

Variable	Rotated Factor Loading
Acuity	70
Seeing Problems (Wind)	-67

Factor 14

Variable	Rotated Factor Loading
Word Fluency (Total)	-75
Word Fluency (B Sub-test)	-74
Word Fluency (T Sub-test)	-69
Seeing Problems (Glue)	-43
Consequences Obvious (Balance)	-32
Word Meaning	-31